

A HISTORY
OF
THE ARMY ORDNANCE SERVICES



LIEUTENANT GENERAL SIR TRAVERS CLARKE,
G.B.E., K.C.B., K.C.M.G.

A HISTORY OF THE ARMY ORDNANCE SERVICES

by

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LATE R.A.O.C.

THE GREAT WAR

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PREFACE TO THE SECOND EDITION

THIS edition of Volume III, covering the work of the Royal Army Ordnance Corps in the Great War, has been produced by the publishing committee in response to a demand from all ranks of the Corps for this volume only. It is thought that all those whose relatives are inscribed on the Roll of Honour would wish to possess a lasting record of their names.

As Volume III of the First Edition did not have a preface by the Author (the late Major General A. Forbes), the following extract from the Preface to Volume I is reprinted.

“I am indebted to Staff Sergeant Rushin, R.A.O.C., for his help, also of those of the R.A.O.C. who by their diaries and other records have helped towards the compilation of Volume III. Beyond those names quoted in the text, these are too numerous to mention. I have to thank Colonel A. R. Oldfield, R.A.O.C., for undertaking all the business arrangements incidental to publication, a laborious undertaking. It is owing to his energy that the book sees the light of day. Lastly, I have to acknowledge my deep obligation to Major Asser, Editor of the *R.A.O.C. Gazette*, who has throughout been a guide, philosopher, and friend, revising my drafts and furnishing me with numerous valuable suggestions.”

The Publishing Committee also wish to record their appreciation of the very valuable work in propaganda and in the distribution of the History carried out by the Staff of the *R.A.O.C. Gazette*. Their special thanks in this connection are due to Major Asser and Lance Sergeant A. Meaden, R.A.O.C.

A. R. OLDFIELD,
Honorary Secretary Publishing Committee.

FOREWORD

WERE I to be asked by an intelligent military historian to send to him the one document which would best indicate the course of development of the World War, 1914-1918, I should choose the record of the Royal Army Ordnance Corps. From that he could gain all the necessary clues to guide him to a knowledge of the British military effort in France, which was ultimately the decisive factor in the greatest struggle which mankind has known.

That document would show that at the outbreak of the War the R.A.O.C. had in France 30 officers and 1360 other ranks : at the close it had 800 officers and 15,000 other ranks : that, beginning in 1914 with one ammunition train and a few hundred tons in reserve, the British Armies in France had in October 1918 eight great depots with 336,450 tons of ammunition and over 120 ammunition railheads ; and that it could give final delivery—to the enemy—of over 9000 tons of shot and shell a day.

Nor would that tell more than half the story. The provision of arms and ammunition is not the sole task of 'Ordnance' : its responsibility is for almost all that the soldier in the field needs except rations ; and the sudden appearance in the records of 'smoke helmets,' and the recurrence thereafter of issues of new types, would tell of how the poison gas of the enemy was met. Sandbags and barbed wire would indicate the trench warfare ; gum boots the fight against the Flanders mud. Every record would show a victory over some new difficulty.

'Ordnance' was the ever-present help of the British soldier in an ordeal of unexampled severity. The devoted and skilful work of its officers and men, supported nobly by the generosity of the people at Home (who never

FOREWORD

grudged anything to the man in the line) kept the Army equipped to a point near perfection. Grave were the losses of our manhood in the World War: but for 'Ordnance' they would have been graver beyond measure.

TRAVERS CLARKE,
Lieut. General.

August, 1929.

CONTENTS

PART I

THE WESTERN FRONT

	PAGE
<i>Chapter I. THE FIRST PHASE</i>	3
Pre-war attitude of War Office towards Ordnance Service in war. Formation of depots in France. Change of base. Ordnance services at the front. Ammunition supply. Re-establishment of original Line of Communications. Daily rationing system. Mechanized transport repairs. Artillery repairs. Equipping Indian troops.	
<i>Chapter II. TRENCH WARFARE—GENERAL OUTLINE</i>	35
Character of warfare. Novel types of equipment and enlarged scope of Ordnance functions. Special characteristics of earlier period. Of later period.	
<i>Chapter III. HEADQUARTERS</i>	55
Division of duties between D.O.S. and D.D.O.S. G.H.Q. D.O.S. moves to G.H.Q. Technical artillery work. Defects of headquarter organization as compared with that of the War Office.	
<i>Chapter IV. THE FRONT</i>	68
D.D.O.S. of an Army. A.D.O.S. of a Corps. O.O. Corps Troops and Army Troops. Officers' shops. D.A.D.O.S. of a Division. Dumps and general repairs. Salvage. Gun Workshops and Gun Parks.	
<i>Chapter V. THE LINES OF COMMUNICATION</i>	89
Installation of Calais base. Other depots. D.D.O.S. L. of C. Provision. Indents. Group system. Method of issue. Accountancy. Transportation. Salvage. Ordnance depot, Paris. Workshops. Recapitulation of base depot work.	
<i>Chapter VI. AMMUNITION SUPPLY</i>	116
Inherent difficulties. Supply organization in 1915. Installation of additional depots. Decentralized supply system of 1916. Explosion at Quevilly. Battle of the Somme. Explosion at Audruicq. Creation of new depots of improved design served by fresh ports of entry. Supply arrangements at G.H.Q., at ports of entry, at ammunition depots. Traffic and labour. Accounting. Defective ammunition and laboratories. Supply arrangements in forward areas. Railheads and dumps. Ordnance Ammunition Units. Frontal repairs. Salvage.	

CONTENTS

<i>Chapter VII.</i>	THE CAMPAIGN OF 1918	PAGE 147
	Review of German offensive. Frontal non-combatant establishments imperilled. Dumps. Officers' Shops and Heavy Workshops. Mobile Workshops and Gun Parks. Ammunition railheads and dumps. Incubus of accumulations of material in forward areas during retreat. Effect of retreat on depots in rearward zone. Equipping American troops. Air raids. Lessons to be learned from retreat. Advance of Allies and signature of Armistice. Effect on Ordnance services of more mobile form of warfare.	
<i>Chapter VIII.</i>	DEMobilIZATION	175
	Original demobilization scheme. The scheme is revised. Plans for evacuating depots. Work in frontal areas. Disposal of surplus stocks.	
PART II		
OTHER ARENAS		
INTRODUCTION		187
<i>Chapter IX.</i>	THE HOME BASE	192
	The War Office. Central store depots and inspection. Ammunition supply. Clothing depots and inspection. Command depots. Colonial depots. Demobilization.	
<i>Chapter X.</i>	THE BASE IN THE LEVANT AND MEDITERRANEAN LINE OF COMMUNICATIONS	211
	Creation of a base at Alexandria. Its extended duties in 1916. The Mediterranean Line of Communications. Its effect on the work of Alexandria.	
<i>Chapter XI.</i>	GALLIPOLI	218
	The Campaign outlined. An Ordnance depot afloat and its inherent disadvantages. Organization of Lines of Communication. Ordnance work on the Peninsula of Gallipoli. Evacuation.	
<i>Chapter XII.</i>	SALONIKA	236
	Reasons for despatch of the Expedition. Inadequate initial arrangements. Supply organization. Special phases of work. Advance into Bulgaria and Turkey. Post-Armistice operations in Turkey.	

CONTENTS

xi

PAGE
252

Chapter XIII. PALESTINE

Summary of supply organization at different stages. Preparations for advance into Palestine. Channels of supply after capture of Jerusalem. Supplies for Lawrence's desert force. Preparations for Campaign in Syria. Supply arrangements after its conquest. Post-Armistice troubles and consolidation.

Chapter XIV. MESOPOTAMIA

272

Origin of Campaign and its conduct by India. Reorganization under War Office management. Occupation of Baghdad. Features of the Campaign. Ordnance Depot, Baghdad. Phases of Ordnance work. Persia and Baku. Capture of Mosul. Demobilization.

Chapter XV. EAST AFRICA

295

Initial German successes. Formation of East African Expeditionary Force. Shifting Lines of Communication and depots. Transport and other difficulties.

Chapter XVI. ITALY

305

British artillery and Ordnance assist in attack on Trieste. The retreat to the Piave. Despatch of British Expeditionary Force. Organization of Ordnance Services. Mountaineering and other difficulties.

Chapter XVII. RUSSIA AND SIBERIA

315

Attempts to combat the Russian revolution and their failure. The Mission to Siberia, its difficulties and abandonment. The Ordnance at Novorossisk. Supply arrangements. Move to the Crimea. Evacuation. Ordnance Services in the Baltic. North Russian Expeditionary Force. Ordnance work during an arctic winter. A Summer Campaign prepared for and abandoned. Events at Murmansk. Evacuation.

CONTENTS

LIST OF APPENDICES

	PAGE
I. TONNAGE BY CATEGORIES OF MATERIALS SHIPPED TO FRANCE DURING THE WAR	339
II. SAMPLE OF SCHEDULE OF CORRESPONDENCE. Q.M.G.'s BRANCH OF THE STAFF, G.H.Q., FRANCE	340
III. SUBDIVISION OF DUTIES IN THE OFFICE OF D.O.S., FRANCE	342
IV. NOTES ON REFITTING A DIVISION IN FRANCE	344
V. DIAGRAM GIVING TONNAGE OF AMMUNITION SHIPPED TO FRANCE	347
VI. AMMUNITION STOCK RETURNS FRANCE, 25TH SEPTEMBER, 1914, AND 8TH DECEMBER, 1917	348
VII. POST-WAR AMMUNITION SALVAGE OPERATIONS IN FRANCE	354
VIII. QUANTITIES OF A FEW PROMINENT ARTICLES OF EQUIPMENT AND CLOTHING PROVIDED BY D.E.O.S. DURING THE COURSE OF THE WAR	356
IX. HONOURS AND AWARDS	357
X. ROLL OF HONOUR	397
INDEX	405

ERRATA

- Page 9, line 21. For "Verchoyle" read "Verschoyle."*
- " 32 " 27. For "made" read "make."*
- " 34 " 2, footnote. For "24/11/24" read "14/11/24."*
- " 124 " 4 from bottom. For "Andruicq" read "Audruicq."*

LIST OF ILLUSTRATIONS

LIEUT. GENL. SIR TRAVERS CLARKE, G.B.E., K.C.B., K.C.M.G., QUARTERMASTER GENERAL, FRANCE	FRONTISPIECE FACING PAGE
MAJ. GENL. SIR H. D. E. PARSONS, K.C.M.G., C.B.	
MAJ. GEN. SIR C. M. MATHEW, K.C.M.G., C.B., D.S.O.	
MAJ. GEN. SIR H. W. PERRY, K.C.M.G., C.B., C.S.I.	55
THE AUTHOR	56
TYPICAL MOBILE WORKSHOP	78
LAYING OUT GUN-COMPONENTS FOR ISSUE	
HANGAR Q AT HAVRE FITTED UP AS A BARRACK	99
LOADING AMMUNITION EMPTIES FOR ENGLAND	
REPAIRING SMOKE HELMETS	110
WRECKAGE OF AUDRUICQ AMMUNITION DEPOT	126
THE STUDENT'S NIGHTMARE	138
MAJ. GENL. SIR J. STEEVENS, K.C.B., K.C.M.G.	
BRIG. GENL. W. H. USHER SMITH, C.B., C.B.E., D.S.O.	
BRIG. GENL. P. A. BAINBRIDGE, C.B., C.M.G.	192
S.S. "MINNETONKA" AND SATELLITES	
ORDNANCE DEPOT, HELLES	
ANZAC BEACH	230
ORDNANCE DEPOT, SALONIKA	243
ORDNANCE DEPOT, KANTARA	
LUDD AMMUNITION STORE	
ORDNANCE WORKSHOPS, JERUSALEM	261
ORDNANCE DEPOT, BASRAH	
WAGON PARK, BASRAH	275
INDIAN TENT REPAIR UNIT	
SORTING SALVED SMALL-ARM AMMUNITION	278

xiv LIST OF ILLUSTRATIONS

	FACING PAGE
THE CITADEL, BAGHDAD	} 286
RIGHT BANK ORDNANCE DEPOT, BAGHDAD	
BRIG. GENL. R. K. SCOTT, C.B., C.M.G., D.S.O.	} 295
MAJ. GENL. A. FORBES, C.B., C.M.G.	
BRIG. GENL. T. W. HALE, C.B., C.M.G., C.B.E.	
ITALIAN TRANSPORTER ADAPTED FOR 6-INCH HOWITZER	} 313
MUZZLE PORTION OF 6-INCH MORTAR AS A MULE LOAD	
AMMUNITION SHED, ONEGA, NORTH RUSSIA	} 331
SLIGHS LEAVING FOR THE FRONT	
MAKING IMPROVISED DIAL SIGHTS DURING AN ARCTIC WINTER	} 335
R.A.O.C. WAR MEMORIAL	

MAPS

	FACING PAGE
WESTERN FRONT	174
GALLIPOLI	234
SALONIKA	250
PALESTINE	270
MESOPOTAMIA	292
EAST AFRICA	302
ITALIAN THEATRE	314

PART I
THE WESTERN FRONT

CHAPTER I

THE FIRST PHASE

THE following passages are taken from a report rendered to the War Office in 1913 by Lieutenant Colonel Forbes, Army Ordnance Department, after attending French Army Manœuvres.

It will be seen that a great contrast exists between the system of supply of stores to the French army and our own system. The French plan is designed to meet a campaign on a large scale in a highly civilized country with the best of rail and road communications. Ours, on the other hand, is based on our experience of warfare in less civilized countries where everything has to be got from a remote oversea base.

Our Ordnance Manual was first compiled after the South African War, the features of which were small independent columns of troops on trek, often out of communication for long periods, replenishing from any Ordnance depot they happened upon; with no big battles involving huge expenditure of ammunition and materiel which would need instant replacement, and no necessity for a centralized administration at the front; in fact conditions in the nature of guerilla warfare. Since then political conditions have changed, and our situation is more akin to that of France, in that the most important campaign we now contemplate, and to which everything else must be subordinated, is one upon the continent.

Taking this for granted the following points arise. In the French army the Director of Ordnance Services would be at the front, in close touch with the commander of his army and with his divisional Ordnance officers. Our Ordnance War Manual allots him an office normally at the base, where he is to carry out his "more deliberate work," and he is then given a sort of roving commission of inspection.

Next as to the divisional Ordnance officer. The corresponding French official has a very considerable staff, he has

the clearly defined duty of supplying all the wants of the troops of his division, and is the actual medium by which such wants are met. His powers of purchase are extensive, and it is his business to make use of them to the utmost before sending back to the lines of communication. With us, except that he collects indents and forwards them periodically to the nearest Ordnance depot, his duties are little more than advisory ; he is not definitely concerned as to how, when or whence articles needed by the troops reach them.

But it is as regards the actual method of supply that our Manual is so specially vague. It is laid down that normally units will make their own arrangements for drawing stores direct from a depot, though how they are to do so is not stated. Such a procedure seems to me inconceivable for a continental campaign. In our field service regulations it is established as a principle of primary importance that ammunition supply must be invariably from the rear to the front. The troops must never have to look back. I hold that this proposition should be the basis of the method of supply of all other articles. In the stress of war troops cannot send back for anything they may want. We have organized a system by which food and forage are supplied in this way, and therefore have a model ready to hand for adoption as regards equipment and other stores. Demands should be met in the same way as those for rations, by means of supplies sent forward via the regulating station, the divisional Ordnance officer attending to distribution.

It will also be noted that in France the supply of Ordnance stores is divided among four services. With us there is only one service, and the main duties at a depot are divided into provision, issue and receipt work, each of the three ranging over the whole extent of the Vocabulary. For our small peace depots this division may be the best ; but for pressure of work on a large scale there is much to be said for division into groups, each dealing with a different class of article. Such a system enables subordinates to specialize ; each obtains a more definite responsibility, and is in closer contact with the actual

work than where there is a centralized office dealing with every class of article.

To sum up, the system I have in mind and have endeavoured to portray is as follows : A Director of Ordnance Services at the front, in touch with the headquarter staff and with a knowledge of impending operations in so far as they affect the supply of ammunition and other materiel ; in touch also with his assistants attached to each main body of troops ; these latter attending to all the wants of such troops, as far as they can from local resources, otherwise by means of consolidated demands for substantially large quantities of what must be obtained from the base ; and finally, all supply to be from the rear to the front.

* * * * *

To open in this manner a page of history fraught with such stupendous events must I fear seem presumptuous ; but I know of no way in which to express so forcibly what was the opinion of those Ordnance officers who studied seriously their Corps war organization, than by quoting from an official document of the year preceding the outbreak of the Great War. That I happened to be the writer was fortuitous. It was the first time any Ordnance officer had attended foreign manœuvres and the contrast between the French and British methods could not fail to strike an observer. But the inadequate staff to cope with Ordnance work at the front, and the lack of an organized system of maintenance similar to that provided for food, had been represented time and again. Of course, no more than anyone else, had those in the Ordnance any conception of the colossal scale on which munitions would be expended in the form of warfare that developed ; but the Ordnance officer, in virtue of his profession, was better able than others to appreciate that, with the constantly increasing complexity of military equipment, materiel was destined to play a far larger part in the battles of the future ; just as had been the case in South Africa as compared with the Crimea—even though the former was a war of movement and the latter stationary.

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The Army Council, however, seemed unable to visualize this fact and prepare a clear-sighted plan for maintaining an army in the field with all the stores and clothing it was bound to want under modern conditions. Its only idea was to withdraw formations periodically to be re-equipped from top to toe by establishing contact with an Ordnance depot which, at the lowest computation, was likely to be some 50 miles to the rear in a civilized country with good roads and railways. There had been a long and bitter struggle before the General Staff and Adjutant General's branches at the War Office would concede even one officer and one clerk for the war establishment of a division. I do not agree, wrote the A.G. of the day when the subject was first broached after the South African campaign, the place for an Ordnance officer is at his depot with his stores—which was merely begging the question and refusing to face the situation. Even among the more senior of our own officers some failed to realize the importance of the subject and gave but lukewarm support. It was the next generation, those who as majors or captains had borne the heat and burden of the day in South Africa, that were the chief protagonists of a more enlightened policy.

Every recommendation in the above report it may be noted was eventually fulfilled. Establishments at the base were divided into groups, each a self-contained depot specializing in a particular class of equipment; and the D.O.S.'s office was established at G.H.Q. But these were trifles compared with the fact that a regular system of maintenance was adopted, whereby stores and clothing could be sent forward daily in the same way as rations, articles in common use being despatched in bulk for distribution. My modest contribution to the problem naturally shared the fate of its predecessors. I was requested to give a lecture at the Staff College and then the report doubtless found its way to the appropriate pigeon hole. And before the lecture was due to take place the Staff College graduates were at Southampton speeding the Expeditionary Force to France.

One other point. The French organization provided

for the regular replenishment of materials as well as food-stuffs, both going forward in the daily supply train ; and at their manœuvres the system was put to practical test. Telegraphic demands for ammunition and other items were received at the advanced base and regulating station (Bordeaux) and acted upon during the progress of the operations. But nothing of this sort was ever attempted at our manœuvres. With us there were no casualties to guns in this mimic warfare, fresh supplies of ammunition were never even called for. Everything, down to the last bootlace, was placed in first-rate order before the troops left for the manœuvre area, and no attempt was made to test the organization of Ordnance services on a war basis.

If however plans for replenishing the equipment of the fighting force lacked attention by our War Office, the same certainly cannot be said as regards the equipment itself. Never was an army better fitted out for the work it expected to undertake than the four divisions and the cavalry division that embarked in August 1914, to be soon followed by the rest of the Expeditionary Force. The order to mobilize was issued on the 3rd August and among the very first to leave on the 8th were Brigadier General (Major General Sir Hugh) Perry as D.O.S. under the Inspector General Lines of Communications and Colonel (Major General Sir Charles) Mathew as D.D.O.S. for service at G.H.Q. under the Quartermaster General ; No. 1 Company A.O.C. from Aldershot following the next day. The destination of all three was Havre, our principal base, outside of which a tented city sprang into existence with lightning rapidity. The site allotted for the Ordnance depot was a portion of the recently constructed Hangar au Coton, a single gigantic shed covering nine acres. On the 15th August Nos. 2, 3, 4 and 7 Companies joined up, and the depot staff, with Colonel Egan as C.O.O., proceeded to establish itself and collect the war reserves that began to arrive with every vessel bringing troops or supplies, a small workshop

being established at a manufacturer's premises in the town.

At the same time subsidiary depots were formed at Rouen and Boulogne. Rouen was destined as the base for mechanical transport, to deal with which a small depot and workshop were established. Boulogne has a special rôle due to its being so close to our shores. The first replenishment of ammunition, some special fittings to enable stretchers to be carried in railway trucks and a few other oddments were landed there in charge of a detachment of the Corps.

After spending a few days at Havre, D.D.O.S. joined G.H.Q. at Le Cateau, while D.O.S. proceeded to Amiens, the site selected as the headquarters of the I.G.C.

It was then decided to form an advanced depot at Amiens, a step which betrayed a lack of clear thinking. In the then situation of our army, or in case of retreat, there was no need for any intermediary between base and front, while had there been a substantial advance Amiens would have been too far to the rear. The town was so near Havre in fact that nothing could be gained by creating a second depot there. The result could only be to duplicate staffs and squander stocks. What the rôle of the Amiens depot was actually to be was not clear; the site allotted for it was minute and incapable of expansion, and everyone with experience of Ordnance work knows how difficult it is to confine the bounds and scope of a depot once it is in being. The truth is that to establish an inland depot at this stage was quite untimely and it is fortunate that nothing was accumulated.

However No. 1 Company, under Lieutenant Colonel Watts, whose services would have been most useful at Havre in getting things ship-shape, was sent to Amiens and a certain amount of work done that could have been carried out better at the base ports. The stretcher fittings were sent up from Boulogne and fixed in tiers in ambulance trains composed of box-trucks painted with the Geneva Cross; and, after all available stretchers had been called for from Havre, more had to be manufactured

at Amiens.¹ It had been foreseen in pre-war days that this would be one of the first things to be done, and obviously stretchers and fittings should have been consigned to the same base and the ambulance trains marshalled there. A workshop was started on the premises of a local firm, and set to work to repair derelict lorries and cars, of which a number were soon scattered about the surrounding roads. These were of all sorts and sizes and as the columns to which they belonged were careful to strip them of magnetos, sparking plugs and everything conceivably useful, it was very little that this shop could do. It would have been better to send the vehicles to Rouen where the Mechanical Transport depot of the Army Service Corps, intended to supply spare parts, was established.

No. 1 Company also found the personnel for the ammunition landed at Boulogne which came up to Amiens in charge of a French escort. After being checked and rearranged this was sent on towards the front by rail with a detachment of the A.O.C. in charge of Lieutenant Verchoyle Campbell. This was another faulty pre-war arrangement. The personnel for this first replenishment should obviously have accompanied its ammunition to Boulogne.

Despite the apple-pie order in which the Expeditionary Force left England, there were from the very first a few demands to be met. For one thing Cyclist Companies had just been formed to work with divisional cavalry, and the bicycles arrived close on the heels of the troops; as did travelling kitchens recently approved for battalions, which failed to reach them before they embarked. There being no organized machinery for the despatch of Ordnance stores to the front, each consignment had to be the subject of a special arrangement to provide accommodation on some troop or supply train, involving much trouble and interviews with the railway authorities.

In a bombastic order the German Emperor had directed

¹ This system was a failure owing to the jolting to which the patients were subject.

his troops as an initial task to crush out of existence the "contemptible little British army"; and in the first encounter at Mons, where we had taken up a position on the left of the French, this came perilously near to happening. We were faced by enormous odds, and forced to retreat with heavy loss. Whole battalions and batteries of guns were almost obliterated and nothing but the discipline and training of our small but efficient regular army saved it from disappearing as an organized force.

By working towards the west and south of Paris, however, in its attempt to surround us, the right wing of the German army by which we were opposed became disjointed from its main body advancing against Paris from the north-east; and a pause was necessary to allow it to regain contact and alignment. This breathing space had vital consequences. The French gathered together their large reserves held for the defence of Paris which was being hastily entrenched and we were able to re-form our shattered forces. Together the Allies hurled themselves against the foe at the river Marne and drove him back to the Aisne where he entrenched. Actually this battle sealed the fate of the war. The crisis was over and Germany's advance stayed for good and all though of course this could not be foretold at the time.

The first result of our retreat after Mons was a decision to evacuate Amiens and Boulogne. To clear out of the former was for the Corps a simple matter. We held nothing beyond some half-dozen lorries fit for little more than the scrap heap, which were abandoned without qualm. The I.G.C. with his Directors and the staff of the Amiens depot moved to Rouen on the 27th August, and on the same day the Ordnance detachment at Boulogne with its few stores embarked for Havre on the s.s. *Inventor*.

By the 29th the situation was so grave that the momentous decision was taken to abandon entirely our main line of communications with its two ports on the Seine, and instal a fresh line based on Nantes and Saint Nazaire at the mouth of the Loire, with Le Mans as headquarters

for the I.G.C. and his Directors. At Rouen the contents of an ammunition park that had just landed, some hospital equipment, etc., were handed in to the depot, and the 900 tons of goods thus accumulated were shipped down the river on the night of the 30/31st August. The lorries in our shop were handed over to the A.S.C. to evacuate, and the Ordnance personnel proceeded by rail to Le Mans, there to open a fresh advanced depot; now a very necessary measure as the base would be so distant.

So far it had been fairly plain sailing, but to evacuate Havre was a very different matter. The complete bodily transfer of a base depot from one port to another during the progress of hostilities was a manœuvre that had never been contemplated, and circumstances could not have been more unfavourable. The move took place just when the army was in retreat and known to have sustained serious losses of equipment; no other source existed from which these could be made good, and the Havre depot was not yet organized and in working order. As there are valuable lessons to be learned from the manner in which this change of base was effected, the operation is worth describing at some length, especially as the very first difficulty encountered shows the importance of the teachings of history.

At the Crimea, Sir Henry Gordon (afterwards head of the old Military Store Department), ascribed the crying want of our troops as due initially to the careless way in which its equipment was sent out from home; it was shipped as baggage and the ship's officers had no responsibility for safe delivery. Yet the war reserves were being shipped in the same haphazard manner. The very first vessel to arrive brought out tents without poles, and stores were not charged to the Master on a bill of lading. Though this may have led to the more prompt despatch from England, the saving was far more than counterbalanced by the time taken in finding, checking and linking together what arrived. The Master took no pains to hand over and get a receipt for what he carried. His one anxiety was to turn his ship round and hurry back

for more. Goods of all sorts came out in mixed consignments on board troopships, and were off-loaded at any available berth at all hours of the day and night without the knowledge of the Ordnance officer who had to search all over the docks for what might belong to him. It was a case of more haste, less speed.

The next point is that we in France were largely ignorant of what was to come. The constitution of the war reserves had been treated as confidential; they were detailed in two printed documents called the Q.M.G.'s and M.G.O.'s schedules—according to which of these officials was responsible that they were maintained intact. The C.O.O. had a copy of the Q.M.G.'s schedule but not of the M.G.O.'s, and was ignorant of what guns, spare parts, wagons, ammunition and other technical gear he was to expect.

Both the above difficulties were made known through departmental channels to the War Office; copies of the M.G.O.'s schedule were applied for, their secrecy being no longer operative, and it was asked that a conductor be sent over with each consignment to deliver the goods carried to the Ordnance officer. Why such seemingly reasonable requests should have been refused it is difficult to understand. The need for knowing what was to come was challenged, and it was said no one could be spared as supercargo. The position might be compared to that of a manager sent to open a new branch of a bank whose liabilities, though at the moment unknown, were bound to be heavy; yet whose head office refused to help him to ascertain either his available capital or further liquid resources.

The position then, when the order to evacuate Havre was received in the afternoon of the 29th August, was as follows: Scattered about the gigantic Hangar au Coton and other sheds or wharves were some 20,000 tons of clothing, ammunition and stores of unknown quantities, with more arriving daily. The articles were in miscellaneous heaps often buried under piles of forage; wagons had been dismantled for shipment, the bodies had not yet been erected on their wheels, machine guns had not been

assembled with their mounts or cartridge belts, guns with their mechanisms, cases of horse-shoes with those of nails. The very spaciousness of this immense shed tempted the Base Commandant to use it whenever he was in want of accommodation and, in spite of protests, horses were stabled among the stores and French and Belgian soldiers encamped there. The French were still removing barrels of oil and bales of cotton lying in the hangar when we arrived and lorries belonging to the Army Service Corps depot, lodged under the same roof, thundered to and fro. Altogether the scene was one of great confusion.

What form the order received at Havre took I do not know, but there is no doubt it was treated almost as a *sauf-qui-peut*. There was a certain amount of panic in the town, French troops being sent to guard the approaches and erect barricades. The first intimation received by the Chief Ordnance Officer, as a thunderbolt from a clear sky, was a telephone message from the Port Naval Officer that all unloading was to cease instantly and everything be bundled back on board ship with the utmost dispatch, some small-arm ammunition being put as deck cargo on each vessel. This was followed by an order from the Base Commandant detailing the priority of loading; firstly ammunition according to its nature—small arm, then 18-pounder and so on; then guns, next engineering equipments, and lastly general stores, clothing, vehicles, etc., according as time might admit. Everything not on board by the 3rd September was to be abandoned. One result of this it will be noticed was that the most vital fighting equipment went to the bottom of the hold. So much stress was laid on this priority that the Base Commandant, happening to spy out some saddlery being hoisted up, issued a peremptory order prohibiting departure from his instruction. The C.O.O. had no discretion, and the effect on the establishment of a new base elsewhere was ignored. Nothing was taken into account beyond the saving at all hazards of equipment of primary military value.

But if the Commandant treated Egan purely as an

executive officer with no duty beyond a blind obedience, what was more unfortunate is that the instructions reached and were acted on at Havre before the D.O.S. was aware of their issue. The first step when a decision so vitally affecting the supply services was reached should surely have been for the I.G.C. to confer with his Directors as to the best means of providing for the troops pending the establishment of a new base ; the more so because reports, though deficient of detail, were trickling in showing that very heavy losses of guns and first line transport had attended the fighting. Immediately Perry had news of the evacuation, he told the I.G.C. that the result must be completely to suspend the functioning of Ordnance services for some time to come, and urged that a substantial proportion of the stock be sent by rail to Le Mans to bridge the interval. The railways however were congested, the population of the country occupied and threatened being in flight. A consignment of ammunition held on rail at Havre had been ordered to Le Mans and permission was only given to send in addition a couple of hundred tons of goods and some artillery equipments.

But by this time what was most vital—such as machine guns—was already on board ship, and the most that could be done was to transfer a few guns back on to rail. However what could be laid hands on was loaded up and by lashing cases and bales on vehicle trucks nearer 400 than 200 tons went straight to Le Mans. Work at Havre proceeded without a break, forty-eight hours more time was allowed, and by the 4th September the whole 20,000 tons was cleared ; the last ship, the *Inventor*—a 10,000 ton liner—sailing for the Loire with the depot staff on the following day. Loss had been avoided but the day of reckoning was still to come.

During this time vessels from England had been diverted, and there was lying off the entrance to the Loire a whole fleet of ships that had to take their turn to come up the river and berth, priority being given to those with reinforcements. St. Nazaire, the deep water port, was found to contain no possible site for a base depot,

so it was necessary to fall back on Nantes, which was but little better. Stores had to be scattered among a number of different premises, some on each side of the river; even the workshops were in five different centres. The *Inventor*, the largest ship that had ever entered Nantes, at the top of a spring tide, held the greater part of the stock; she could only berth on the left bank and most of her contents had to be sent round to the other side of the river by rail.

The stores, loaded in this haphazard way, were in hopeless confusion. There were cases of service dress caps, parts of guns and machine guns, bales of horse-rugs and blankets, ammunition, tentage, signalling gear, etc.—much in broken packages—mingled with forage, medical, veterinary, and other goods, just as they had been indiscriminately bundled into the hold; and to sort out this chaos was a lengthy and tedious operation, accompanied by a considerable amount of looting. By this time urgent demands were pouring in, and the first task was to seize hold of anything called for as it came over the ship's side, and rush it up to Le Mans without any attempt at verification. Side by side with this the residue had to be sorted out little by little so as to take stock and make a fresh start.

Just at this time Sir John Stevens, from the retired list, was appointed D.E.O.S. at the War Office. His very first act was to send out a list of what stores were due to France from a certain fixed date, and to arrange for a supercargo to accompany each future consignment. This at last gave a bedrock foundation on which to build up records, and ascertain what further to provide. Thence onwards the shipment of Ordnance stores was on a proper footing, the work at the port of embarkation was supervised by an Ordnance officer and the consignment charged to the Master on a bill of lading.

Meanwhile the advanced depot staff at Le Mans had been allotted the fine goods station of Maroc, with good accommodation and rail facilities. And no sooner did it arrive, just as the retreat was checked and our troops were once more engaged, than it began to snow indents

and hasteners on indents that had gone astray in the disorganized French post; some submitted in August still turning up as late as October. To meet these there was nothing but the small stock sent round by rail from Havre which was hopelessly insufficient. As fast as liabilities were ascertained they were wired to Nantes where endeavour was made to send up what was wanted, but progress was of necessity slow. Machine guns would be found without belts, harness without some necessary component; the boots that first came to hand would be all of one size.

Even where articles were available there was grave difficulty in getting them to the troops. Of course the pre-war arrangement that units would withdraw to refit was impossible, no one dreamt of such a thing now; but a chain of supply to the front was as yet unorganized. Fortunately the Ordnance depot was alongside that of the A.S.C. and the C.O.O. was able to arrange informally for trucks to be attached to ration trains. As far as possible the actual indents of units were worked to, parcels were made up and addressed to the regiments concerned in the hopes that they might find their way with rations to the right address. Often however the only information to hand was that such and such a division was badly in need of socks and boots or whatever it might be; when the only thing was to send up as many as possible in bulk and trust they might reach those who wanted them. But as often as not the truck would come back intact, there being no means of delivery from rail-head. This plan moreover was discouraged, for it was apt to result in looting and the unequal distribution of an all too scanty stock. It was the same with transport wagons. Although clamoured for, there were neither men nor horses to remove them when they reached rail-head; and back they came to Le Mans until a horse transport depot was established there to supply wheeled equipments of all sorts, complete with harness, teams and drivers.

Much was needed besides guns, machine guns and first line transport. Great-coats and packs had been thrown

away wholesale during the long forced marches in the heat of an August summer; and clothing, boots and horse-shoes were beginning to wear out. In many instances the whole of the war reserve proved insufficient to make good the wastage and more was already being telegraphed for from home. The I.G.C. had searching questions to answer from General Headquarters as to why the troops were not being re-equipped more quickly. These he found it difficult to deal with, having held himself rather aloof from Ordnance matters. His only suggestion at this time was that a committee of "sensible experienced officers" should assemble at Nantes to consider the question of accommodation and advise as to what portion of the stock was redundant and could be sent home. It was even proposed to return the whole of the plant sent out as part of the war reserves to equip a base workshop. But Colonel Marrable, Base Commandant at Nantes, was striving his very utmost to find suitable accommodation; not only was all the stock wanted but more was being demanded, and the situation was then improving daily under the supervision of Colonel (Brigadier General Sir Thomas) Heron, a retired officer of ripe experience who had been sent to Nantes to straighten matters up. The date for interference should have been a fortnight earlier, when the evacuation was ordered. Now only time could effect a cure.

The upshot was that General Maxwell was sent for as I.G.C., his predecessor's departure being followed by that of his D.O.S. Maxwell was a man of very different calibre, a glutton for details who wanted to know the why and wherefore of everything. He at once started a daily conference which might last from eight o'clock to lunch time, when he closely cross-examined all those in attendance and required information as to the position of every item of which there was even momentary shortage. These questions it was usually impossible to answer, as no one yet knew the stock figures. The Ordnance was under a cloud, and Perry was inclined to resent these close departmental enquiries. It was natural that Maxwell should blame him because things had gone

wrong ; and, having given the dog a bad name, he proceeded to justify his opinion by hanging him : a judgment reversed when General Perry, after filling the post of D.O.S. Mesopotamia, was selected by India as chief of its newly formed Indian Army Ordnance Corps.

But the truth is that one must look far beyond any action or want of action on the part of subordinates to account for the temporary breakdown of Ordnance services in September 1914. The explanation lies in the fact that our army had suffered reverse and that, in the words of the homely adage, you cannot make omelettes without breaking eggs. Our plans of operation were framed on the assumption that we could hold the ports of the Channel and the Seine. So far was this from being the case that, but for the stout front shown by Belgium, we could not have held them even as long as we did. After Mons there was an idea of concentrating our army south of Paris to be reorganized out of contact with the enemy ; and in this case the method of evacuation of Havre would not have mattered so much. The subsequent decision to remain in the battle-front entirely altered the aspect of affairs. It was now necessary to refit with the utmost speed and while in contact with the enemy, an operation for which the system of replenishment contemplated by our field service regulations made no provision. Further, the reverse to our arms occurred so early in the campaign that the depot at Havre was still unorganized, and celerity was the one and only factor that dominated its abandonment. It is in these facts that the explanation is to be found, and it is bootless to search further and seek for scapegoats among subordinates.

It is now time to turn to the happenings of Ordnance representatives at the front and see how they had fared ; and for this I cannot do better than quote from a narrative compiled by Major Jasper Baker :

“ In peace time, before the war, an officer of the

A.O.D. serving at home was selected to fill the appointment of D.A.D.O.S. to each division of the expeditionary force. These officers were notified personally by the War Office of their appointments and of the day, after mobilization was declared, on which they were to join their divisions. The establishment of the D.A.D.O.S. consisted of himself and one staff sergeant, and these two, with the aid of a horse and box of stationery were, in the words of the Ordnance War Manual, expected to "deal with all matters affecting the Ordnance services of the division."

"I was detailed as D.A.D.O.S. 2nd division and duly joined its headquarters at Aldershot on the 10th August. On arrival the G.O.C. asked me what orders I had and on showing him the Ordnance War Manual 1914 he remarked that I was in for a fairly easy time. The division remained at Aldershot till the morning of the 15th, and the five days intervening were very busy ones, completing the equipment of all units as far as possible; the main deficiencies being travelling kitchens and the bicycles of the Cyclist Company.

"We arrived at Havre on the 16th, where we remained for two days. The D.O.S. was at Havre and gave each D.A.D.O.S. instructions which related chiefly to the necessity for recording at least the main items of stores indented for and issued, the advisability of making the utmost of opportunities of local purchase, and that endeavour must be made to obtain the use of lorries of the Supply Column to convey from railhead any stores that arrived.

"The division was concentrated at Wassigny and, as there was still no sign of the bicycles required, I proceeded to Valenciennes and arranged for their purchase. This purchase was never effected, as the bicycles arrived from the base the next day, and before those ordered from Valenciennes could be delivered, the town was in the hands of the Germans. When at Valenciennes, I arranged through the Maire to meet the leading merchants of the district and obtained from them details of the local resources of the neighbouring factories.

"The day after the battle of Mons I received a waybill by post showing that my travelling kitchens had left Havre several days before. The post arrived at 10 p.m., the railhead for the day was some 40 kilometres away and my only means of transport a horse which had already marched since 5 a.m. The difficulties of transport here became very apparent. I was informed that there would be no room in the supply lorries for Ordnance stores and no means of transport for the D.A.D.O.S. to get to railhead. The occasion, however, was not a good one to discuss these matters, as the whole of the headquarters staff were thoroughly tired out and our chief anxiety at the moment to snatch a few hours' sleep. The next day I met Major Cowan from G.H.Q. who informed me that he had seen several kitchens offloaded at Valenciennes two days before but that the town was now in the hands of the enemy."

For many days after this the division was continually on the move, passing through anxious moments and receiving gloomy messages and rumours of disaster to other of our troops. New boots were already wanted and the stocks in villages passed through were bought.

"On the 28th August we were told that we had come to the end of our retreat and a day of rest was ordered for the morrow. No sooner was this order sent out than indents flowed in, and my staff sergeant and myself spent most of the night and the whole of the next day dealing with these and forwarding them on.

"During the 29th, the remnants of the 1st East Surrey Regiment, 3rd division, which had been badly cut up at Le Cateau, marched in and, having no further use for its regimental transport, handed it over to me enabling me to make good the more important deficiencies in transport of my own division.

"The next day I received an urgent indent for picks and shovels to dig trenches. I went into Soissons but found great difficulty in obtaining anything as it was Sunday evening and all the shops shut; but finally, with

the assistance of one of the officials of the Mairie, I found a French military store with a civilian foreman in charge, who gave me the whole of his stock."

Next day the retreat had to be resumed and on the 3rd September the first consignment of stores arrived—mainly clothing sent up in bulk for the 1st and 2nd divisions and 5th cavalry brigade. By now a definite order had arrived from G.H.Q. that D.A.D.O.S. was to be provided with means of visiting his railhead daily and suggesting that he should share the supply officer's car.

"Now came the difficulty of transport from railhead ; not one of the officers commanding Supply Columns would detail me a lorry, but after a good deal of argument and persuasion I got each to take at least one or two packages and eventually got all the goods away. I gave each driver a note to the Brigade Supply Officer to say what stores he was carrying and asked him to arrange issue, and wired to 1st division and 5th cavalry brigade a detail of what was being sent up. The next day I found that the stores had been delivered somehow or other, but of course the distribution was far from satisfactory ; however, as the quantities received were an infinitesimal proportion of the requirements and troops were only too glad to get anything, this did not matter very much."

After this, consignments began to arrive at almost daily intervals, sometimes in bales for distribution and sometimes in parcels addressed to individual regiments ; and always there was the same difficulty in getting them forward to the troops from a railhead that constantly shifted. Occasionally the loan of a lorry would be obtained, but as often as not trucks full of what was badly needed had to be refused delivery and sent back. On the 12th September, for example, horse-shoes arrived for horses almost on the bare hoof. "Again I was refused a lorry or any means of transport, but fortunately D.D.O.S.

G.H.Q. arrived and argued the point with A.Q.M.G. 1st Corps who also happened to be there ; with the result that I was given one lorry for horse-shoes and the remainder of the truck load had to be returned."

After this the division came to rest for nine days with its railhead at Fère-en-Tardenois where G.H.Q. was situated and under Colonel Mathew's watchful eye matters became a little easier.

This narrative supplies one clue to the doings of the D.D.O.S. at G.H.Q., who had to keep in touch with the Ordnance officers of divisions, and do his best to help them out of their difficulties, though he also was at first handicapped by being dependent on others more fortunately situated for the use of a car. Transport in fact was the prime difficulty of all Ordnance officers at the front at this time. Despite assurances on the part of the Director of Transport, divisional Supply Columns either would not, or more probably could not, carry stores or clothing. It was not until Mathew himself collected statements from the officers of these columns definitely saying that they were unable to cope with anything beyond rations, and the Q.M.G. intervened, that more active steps were taken.

D.D.O.S. had another even more important pre-occupation. Our war organization provided for mechanized Ammunition Parks at the rate of one per division, to link up the railhead with the points where contact was established with the horse-drawn ammunition columns. These parks were not themselves divisional units, they formed a part of the organization of the line of communications ; but when it came to the actual test of warfare, it was at once evident that it was impossible for a far distant I.G.C. to control either them or indeed the railhead from which they operated. The matter was one that could not be dealt with except at G.H.Q. ; and thus it came about that the Q.M.G. entrusted the whole duty of organizing ammunition supply in rear of divisions to his D.D.O.S. He had to arrange the movements of the

ammunition railhead, whose site at this time changed almost daily, to see that the parks kept in touch on the one hand with the railhead and on the other with the divisions they served, to attend generally to their replenishment, and keep a watchful eye on the stock. Fortunately, compared with the experience of later years, expenditure was small; but complications were caused by the throwing out of gear, during the retreat, of the organized system of supply, batteries often drawing direct from one or other of the parks and short-circuiting the divisional echelons.

It had been the intention to forward ammunition from the line of communications in trains loaded with a standard pack, some of each kind used. Each train was to be in charge of an Ordnance officer and, after replenishing ammunition parks at railhead, was to return to the base to fill up to its standard. At the same time as No. 1 train under Campbell was sent forward from Amiens, No. 2 was formed at Havre; but this, as we have seen, was diverted to Le Mans, where it remained for the time being. "Campbell's train," as it came to be officially styled, had some stirring adventures. First it went to St. Quentin, pushed on to Busigny, and then retired again to St. Quentin, there to provide ammunition parks with 100 tons of ammunition. Then came the battle of Mons, after which the train was sent back to Amiens *en route* for Creil, to the north of Paris. While part of the train however, delayed by a hot axle, was still in Amiens station, fresh orders arrived at midnight of the 26/27th August, giving Noyon as destination, to which place as much ammunition as possible was to go by road on any lorries that might be available.

By 6 a.m. on the 27th the supply of lorries ran dry and Perry, who was on the point of leaving, ordered Campbell to follow with the rest of his ammunition by rail to Noyon. At this time the station was a seething mass of humanity seeking to get away to safety, for there were rumours of Uhlans having been seen close by; and, on returning after a temporary absence, Campbell found his men

had been ordered into a train crowded with refugees. He protested that his instructions were to go to Noyon, but was told by a very harassed Commandant to embark on the refugee train. The position was a difficult one for a young officer with a definite instruction from his Director and a contradictory one, though only verbal, from the senior officer remaining on the spot. The ammunition might be vitally needed, and fortunately Campbell was an officer of resource. He spirited his men away one by one, bluffed the French stationmaster into providing him with an engine by the threat that otherwise he must blow up his ammunition and wreck the station, and got away to his appointed destination in safety with his men as an armed escort on the footplate, having providentially annexed a contribution of food, and several motor bicycles—all very valuable acquisitions.

After this the train was constantly on the move, a careful watch having to be kept on stationmasters and engine-drivers anxious to be rid of such a dangerous cargo and send the train for safety in the direction of Paris. The ammunition sent by lorry from Amiens was reloaded on rail, the portion that had gone to Creil rejoined, and invaluable work was done in filling up ammunition echelons at one place and another at all hours of the day and night. The train also furnished the explosives which enabled an important bridge at Compiègne to be destroyed. On the 15th September it came to rest at Fère-en-Tardenois (G.H.Q.) where it was replenished by the contents of No. 2 train, and thereafter by truck loads sent forward from day to day. By now some 6-inch howitzers had arrived in France and the train was split in two, a portion under Lieutenant Cunningham ("Cunningham's train") being located at Mont Notre Dame to deal with the heavier natures—6-inch howitzer and 60-pounder.

After the battles of the Marne and Aisne the headquarters of the lines of communication advanced to Villeneuve-St-George on the outskirts of Paris. Shortly

afterwards Antwerp fell, and a second great wave of German troops over-ran Belgium. The French took over our front on the Aisne and our army was transferred by rail to Flanders to oppose this new advance which was finally arrested at Ypres and on the Yser with desperate fighting, after which both sides entrenched. In this fresh position G.H.Q. was established at St. Omer and headquarters L. of C. at Abbeville, where they were destined to remain for many weary months to come.

All this time the situation at Le Mans and Nantes had been improving so that General Parsons, who relieved Perry on the 9th October, and who moreover could not be held accountable for any shortcomings of the past, started on a rising ride of prosperity.

It will be generally admitted, I think, that no better selection for this appointment, which he continued to hold until shortly before the cessation of hostilities, could have been made. For one thing Parsons had a ripe experience of Ordnance work in the South African War and, although not highly intellectual, he possessed a sagacity eminently practical combined with a fund of shrewd common sense and a very unusual power of concentration. These characteristics enabled him quickly to grasp the essentials of the many new problems that so constantly presented themselves and, for the time being, discard absolutely from his mind every other consideration. Details he would not worry about, leaving his assistants to deal with them unfettered, and contenting himself with a general supervision. His subordinates could always be sure of his whole-hearted support; and as he was an excellent judge of character, with a happy knack of selecting the right man for the right post, nothing could have worked better. The interests of the Corps which he was so proud to command in France (and afterwards as its chief at the War Office) were always very close to his heart. Another very valuable characteristic was a particularly genial manner that endeared him to all—superiors, equals and inferiors; and lastly, though certainly not least, he had the best of health and

a stout constitution without which no one could have withstood the prolonged strain of actively supervising each branch of such a large and varied organization as the Corps developed into before the war was over.

Havre was now held to be amply secure, and it was decided to make it once more our base, Nantes being very inconvenient on account of its distance both from our home ports and from our new front. But this time the manœuvre was carried out in an orderly and systematic manner and without any dislocation of work. In the first place some half of the stock was railed to Le Mans to carry on with while the link with the base was broken. The staff at Nantes was then free to concentrate on the checking and packing of the residue, consignments from home being diverted to Havre. There, fresh premises were taken up in the dock area with 300,000 square feet of covered accommodation, what arrived being distributed among the new storehouses in the arrangement of grouping adopted at Nantes. The order to change the base was issued on the 27th October and was effected by rail, group by group, each group officer taking over on arrival what was already in his storehouses. By the 9th November the new base was able to function, the operation having been effected with the utmost smoothness, in striking contrast to the previous move.

This resulted in the peculiar situation that the base was far in front of the advanced base, Le Mans being 150 miles south of Havre and 370 from our front line; the next step therefore was to explore new sites for an advanced base. After examining the possibilities of Abbeville, Amiens and other centres, it was wisely decided to concentrate at Havre; for there was no more need of a depot further forward than in August.

But the army was rapidly expanding in strength, and it was thought that the wholesale work of a base depot—dealing with receipts in bulk from England—and the retail work of the advanced depot—distributing small parcels to the front—had best be kept apart. The

original idea was to keep the two establishments separate and locate the advanced base at the railway station of Gravelle, three miles away from the docks, to satisfy indents from the front. Le Mans continued to function till the 1st January 1915, when it despatched its supervising staff and outstanding indents to Gravelle, after which the stock remaining at Le Mans was transferred to Havre. This operation also was effected with perfect smoothness and without interrupting the even flow of goods to the front, the resultant saving of time in meeting demands owing to the abandonment of Le Mans being twenty-four hours.

Just at this time, however, a system of issue, to be presently described, was coming into operation which immensely eased the work, making a dual organization at Havre unnecessary; and the advanced base staff was amalgamated with that of the base, Gravelle being turned into a depot for stores returned from the front.

During this time three new depots were founded. St. Nazaire had been the base for re-inforcements, hospitals, etc., a small depot being formed there to furnish what was wanted. When we evacuated the ports on the Loire this establishment was shipped to Rouen to carry out similar work, and a new workshop set up to deal with mechanical transport. With the abandonment of Le Mans the advanced horse transport depot moved to Abbeville, where a depot was opened to provide it with wagons, harness, etc. These however were then but small affairs.

Boulogne, which was reopened, became a far more important centre. Early in October the 7th division was sent out as a semi-independent force to the coast of Belgium to operate against the flank of the new German advance from Antwerp, the force being accompanied by a reserve, mainly of ammunition, in charge of Lt. Col. (Brig. Gen.) Slade Baker, who arrived on the 9th October at Ostend, where there was some idea of forming a new British base. But the division was unable to make good

(it eventually joined the main force), and before the ammunition was all on shore it had to be re-embarked and go to Dunkirk where there occurred a second unsuccessful attempt to establish a base. Finally Slade Baker found a home at Boulogne on the 15th October, just as our troops were being transferred to their new front in Flanders. At this time there began to be a great scarcity of ammunition; every hour's delay in delivery from England was vital and it was decided to make Boulogne the port of entry for ammunition. Campbell's and Cunningham's trains were despatched to railheads at Aire and Arque, and the rest of the ammunition all over the lines of communication was concentrated at Boulogne.

It was now that the thorny question of providing some systematic way of replenishing the equipment and clothing of troops at the front was finally settled—"as a result of the experience of the war"—so the C.-in-C. expressed it, though the solution was one that had been long advocated by many in the Ordnance. Active service forced the higher command to tackle a problem it had persistently shirked during peace. The advent of winter combined with trench warfare amid the mud of Flanders led to heavy demands; warm clothing, boots, socks, blankets, tentage, braziers, etc., being called for in immense quantities.

The problem presented itself under four aspects. There was firstly the question of transport by rail. Next was the difficulty of getting the goods forward from the railhead. The A.S.C. was responsible for feeding the troops and looked upon anything else it might be called on to carry as an incubus—"this bugbear of Ordnance Stores" it was styled in a letter to the Director of Supplies and Transport at the War Office. Thirdly, even if provided with transport, D.A.D.O.S., with all the goodwill in the world, having but one clerk, could not possibly attend daily at railhead, unload and check his goods, and deliver them item by item to the various units by whom they were wanted. Lastly, the army was rapidly growing in size, and to pack up and address thousands of small

parcels at the base was becoming a formidable business, and one bound to involve delay.

Still clinging to the old idea of a complete periodical refitment, the I.G.C. proposed to solve these cognate difficulties by sending up, once a fortnight, a large train-load accompanied by a staff of issuers to each division in rotation; and by placing a central pool of lorries at the disposal of the division whose turn it was to be re-equipped. But now it was possible for the D.O.S. and D.D.O.S. to point out from recent experience the serious results of keeping a regiment waiting a fortnight for boots, to say nothing of guns or rifles. This argument clinched the matter and it was decided that one or more truck loads of Ordnance stores must be attached to each daily ration train.

The scheme as it finally took shape was as follows: Each D.A.D.O.S. sent periodical consolidated demands to the base (all indents at this time went over the wires) for certain categories of stores and clothing for which there was a constant call. Days of the week were fixed on which the demands for each category were to be submitted and on which what was sent up in response was to be forwarded; while on intermediate days the base sent up miscellaneous items that could not be treated in this way. At each railhead was stationed a representative of the base depot to hand over to D.A.D.O.S. what arrived for him and take over in exchange what was to be evacuated.¹ In place of a central pool of lorries, D.A.D.O.S. was provided permanently with a lorry for each of his brigades and with extra staff.

The plan answered admirably. Work was decentralized and distributed over the week and every one knew from day to day what job lay before him.

¹ In the early days convoy-men (sometimes A.O.C. but more often infantry details) invariably accompanied consignments, being given vouchers and waybills for which they were expected to get receipts. But the men often got lost, trucks were looted and it was impossible to trace the delinquent. When these N.C.O.'s were posted there was great improvement, and in July 1915 convoy-men were abolished, the trucks, with the necessary documents enclosed, being sealed.

Subsequently it was found that one lorry per brigade was not enough, a fourth being added in February 1915 for divisional troops; so that the one clerk and horse of the D.A.D.O.S. expanded into an establishment of four warrant officers, four clerks and six storemen with a motor-car and four three-ton lorries. Cavalry divisions had a similar organization differing only in detail.

One example will suffice to show how essential these arrangements were becoming. By the summer of 1915 horse-shoes were expended at the rate of 400,000 pair a month. They were in seventeen sizes or of thirty-four different sorts, allowing for fore and hind, and each had its appropriate species and number of nails. To pack up at a base depot the right quantity and size for each individual unit, which depended on what horses it had at the moment and how heavily they had been worked, would have been manifestly impossible. On the other hand D.A.D.O.S. could not have distributed a truck-load of horse-shoes to those who wanted them without assistance.

The next matter to be tackled was the repair of mechanized transport vehicles. In the years before the war there had been talk of creating centralized workshops to deal with every class of army work; and though this idea never materialized, one result was that the repair of motor-cars and lorries—then a new service—was entrusted to the Ordnance, sooner than open a new class of workshop. But the scheme was never fully operative as the army possessed few such vehicles, trusting to commercial organizations to augment its resources in war. The division of responsibility was that the A.S.C. provided the vehicle with all its components and carried out light repairs at the front, while the Ordnance was to do the heavy class of work that involved a regular overhaul at a base.

The division between light and heavy was however very elastic, and the shortage of mechanized transport in France created a natural disinclination to part with any vehicle that could be patched up and kept running at the

front. Garages were to be found in the towns we occupied, and it was only a very small fraction of what needed mending that found its way back to the Ordnance workshop at Rouen. Moreover, what arrived had usually been stripped not only of accessories but sometimes even of engines and axletrees. It was the duty of the M.T. branch of the A.S.C. to provide the fittings to replace breakages or deficiencies, but as the stock was scanty the M.T. naturally used it in preference to reinforce vehicles already on the road, and the Ordnance mechanics spent most of their time manufacturing an assortment of components.

There were in January 1915 but 30 lorries in the workshop, and the whole could have been turned out in three weeks had the necessary parts been available. It came in practice to this. The A.S.C. kept its transport going till it was absolutely broken down, for which no one could blame it seeing there was such a scarcity, and then handed it over to the Ordnance to be rebuilt out of next to nothing. The establishment formed to deal with this small volume of work was cramped. Garages at the front might not always be forthcoming and constant tinkering was bound in the long run to lead to an increased call for heavy repairs. Yet nothing definite could be foretold, nor could preparation be made for some sudden great expansion.

Altogether the position was most unsatisfactory and, as a remedy, it was decided in January 1915 to hand over to the M.T. all the work from start to finish. To make one branch responsible for repair, and another for the materials wherewith to carry it out, had been a thoroughly unsound policy, and at the time there was no other way of putting matters right.

This had the further advantage of setting free the services of the Ordnance mechanics at Rouen for the more highly skilled and accurate work of examining and repairing artillery equipments, always their most special duty. After the South African war, which proved the utility of well-found workshops, it was decided to build

up a nucleus of machine tools wherewith to start a base workshop, and this nucleus was sent to France with the war reserves. But there was at first no time to take it into use and it was only after Havre was re-occupied that it was installed in workshops formed at the Usine Deutsch. Moreover, no sooner did our army come to rest on the Marne, than the want was felt of an organization capable of repairing guns close to their batteries. Our field gun with its recoil mechanism required far more attention than the simple equipments used in South Africa, and guns had continually to be withdrawn from the line, chiefly on account of buffer trouble. In September, the War Office was asked to equip a workshop lorry to be stationed at the front, and this proved so useful that two more mobile shops were sent out in November and a further three asked for in December. Forecasts had by then been received showing that a number of large howitzers were already under manufacture and would arrive in the spring; and Parsons very wisely appointed to his staff in December Lieutenant Colonel Paul, the senior Ordnance Mechanical Engineering Officer in France, to advise him on technical matters.¹

One further occurrence during the opening phases of the war remains to be chronicled—an episode, though one that gave much trouble at a time of great difficulty. Early in September the author was sent to Marseilles to make advance arrangements in connection with the arrival of the two divisions and cavalry expected from India. The Indian Ordnance Department had no concern with clothing, the full dress uniform alone furnished by the State for Native troops being found by the Supply and Transport Department. I remember asking the S. & T. officer who arrived with the advance party at Marseilles how clothing would be replenished, and his reply that he supposed the regiment would write to India where the garments would be made up in the bazaar and

¹ These officers were still styled Inspectors of Ordnance Machinery, but the title was so out-of-date that I have employed throughout the more modern phraseology adopted after the war.

forwarded to it. India had made no provision for such a contingency. There were also items of equipment furnished by the S. & T., notably transport vehicles and harness, others were found by the Engineers, and others again the regiment itself purchased.

From guns to boots the reserves sent from India were paltry, and I had to wire my Director that it seemed evident, whatever the custom in India, we should have to maintain the troops, Native as well as British, with all their clothing and equipment so long as they remained in Europe. It was obviously out of the question to have two different systems for a mixed force operating together, and the arrangement by which Indian troops provided much for themselves was impossible so long as they were separated from their source of supply by a sea journey of many thousands of miles.

This of course is what occurred, though there were many preliminary difficulties. To begin with, India had not adopted the latest type of rifle used in the home army and its weapon fired a different ammunition. Rifles, bayonets, machine guns and ammunition had to be sent to Marseilles to re-arm the whole force, which was then concentrated at Orleans to be re-equipped. The Indian ground sheet was not water-proof and all had to be exchanged. Telephone apparatus was not interchangeable with that of our army, nor so up-to-date; this had to be replaced. Cavalry provided their own swords, and that of one regiment would fit neither the scabbard of another nor that of the British cavalry. The agent in England who supplied swords to one regiment obtained the blades, so it was rumoured, from a German firm. The Indian Government furnished officers with neither tentage nor saddlery. Their tents, bought privately, were of all sorts and sizes. It was impossible to expect officers to provide for themselves under active service conditions in Europe, and all this miscellaneous collection had to be taken over and priced, the officer being refunded the estimated value. Indian cooking, eating and drinking utensils, which the regiment itself was wont to furnish, were a great source of trouble.

There was much variety and to supply the wrong type might offend customs of religion or caste.¹

All this had to be done at a time when stocks were the very reverse of plentiful and the work contributed largely to the burden of the Corps at a time when it was struggling under adversity.

¹ Here is a telegram on this subject which I kept as a curiosity :

Ordnance Marseilles to Ordnance Communications, 24/11/24.

Mahomedan or Punjab Lotah has a spout, with or without a handle. Hindoo or Bombay Lotah generally of brass but has no spout or handle, is carried by lip. Hindoos and Mahomedans here both agree that a Katorah never has a spout but is a sort of metal bowl. Confirm that you want the spouted article for which nearest substitute is enamelled teapot. These can be obtained locally, price three francs, also enamelled substitute for Parat, price between three and four francs. Delay in reply owing to communications with manufacturer in Belfort. May I purchase as order must be given at once.

CHAPTER II

TRENCH WARFARE—GENERAL OUTLINE

IT is a truism that, over long periods of history, the scales of battle have been evenly balanced between arms and armour—using the words in their widest possible sense to imply every form of attack and defence—for otherwise warfare could not exist. Yet there have been times when some mechanical invention, by tipping the beam in favour of one or other, has profoundly modified the whole character of military operations. The discovery of gunpowder which dealt the *coup-de-grâce* to the armoured knight is an instance that will readily occur to the mind; while the invention of the bayonet, which completely established the pre-eminence of infantry as the chief fighting arm, was hardly less important.

The World War, although it was realized only dimly, if at all, occurred at just such a period when the magazine rifle, and still more the machine gun, had imparted to the defence a marked superiority over the attack. A comparatively thin line of entrenched infantry, itself immune from shrapnel and bullets and protected from assault by barbed wire, was able to pour out such a deadly stream of accurately directed fire as to make direct onslaught, even by a far larger body of adversaries, too costly to be attempted until the defence had been largely annihilated by extraneous means.

All the efforts of military science were therefore at once concentrated on restoring that balance without which the supreme aim in warfare—the concentration of a superior force at a vital point—was of no avail. The engineer and chemist vied in producing giant howitzers and mortars to search out and pulverize trenches with high explosives; aeroplanes to discover and bomb hidden defences; cylinders and projectiles to emit poison gas and stifle resistance; armoured tanks, invulnerable to bullets, to sweep away obstacles and attack at

close quarters; besides grenades and a host of minor appliances.

But Science holds a two-edged sword which can be used for defence as well as offence. Single lines of trenches gave way in favour of resistance organized in depth, with labyrinths of wire entanglements and related machinegun posts that had to be overcome before numerical strength was encountered; gun fought gun, aeroplane aeroplane, anti-tank guns and delay action mines attempted to destroy tanks, means of protecting the soldier from gas and shell splinters were discovered, pictorial art came to the aid of concealment; and so the duel went on with the scales still loaded in favour of defence.

It may be noted in passing that the search for equality still continues. The mechanization of our army is simply a further attempt to increase the power and immunity of the attack; and, should this gain the upper hand, new mechanical means of defence will doubtless be exploited. Thus warfare ever becomes more and more a matter of materiel and engineering and less and less a matter of thews and sinews.

In pursuit of these objects the entire populations of the nations engaged were drawn into the maelstrom, and to a great extent those of neutral countries. Not only did the making of munitions become a great State industry, but for four bloody and ruinous years, during which we raised recruits by the million, there was an unparalleled drain of almost every commodity, domestic as well as military. In warfare efficiency alone counts, economy has to go to the wall and materiel as well as lives must be prodigally expended. Every man and woman, every kind of raw material, every manufacturing process was placed under contribution; and the war became one of attrition, where victory depended upon which side could first exhaust the physical resources, man-power and moral fibre of the other.

The Germanic Powers, acting on interior lines, had the advantage of being able rapidly to transfer men and munitions from one front to another, but in other ways

TRENCH WARFARE—GENERAL OUTLINE 37

these conditions favoured the Allies. Having the command of the sea, we swept the enemy's flag from the surface of the ocean, and had the markets of the world at our disposal. We proclaimed the whole of the North Sea a blockaded area and did our utmost to prevent not only contraband of war but supplies of every sort from reaching Germany. Germany retaliated by attempting to stop all shipping from reaching the Allies by means of under-sea boats. The submarine's only chance of safety lay in staying concealed under water where it could distinguish neither the nationality nor the type of craft it was attacking; and a more ruthless form of warfare, one more abhorrent to the usages of civilized nations, it is impossible to conceive. Neither liners nor hospital ships were exempt and their crews and passengers were abandoned to their fate. At one time it almost looked as if we might be starved into surrender, but means were discovered of combating this formidable marine weapon and the ultimate result of this ruthlessness was to drive America, the only great Power so far neutral, into the struggle on the side of the Allies.

Over and above these factors of modern warfare, however, there were special reasons why materiel should be so particularly essential on the main front in France and Flanders. For close on four years following the battle of the Marne, which put an end to open warfare, there was never a great victory evolved by military genius and carried to a decision by brilliant generalship. Stretching from the North Sea to the neutral territory of Switzerland were, by mid-winter 1914-15, continuous lines of trenches; and, with no flanks to be turned, there was little opening for strategy. The only hope of accomplishment lay in frontal attack and the actual destruction of the opposing force, which was impossible without overwhelming supplies of munitions.

In the intense and prolonged operations, whose object was to break through the enemy's defences, millions of men were employed and millions of shell expended. Yet, although the attack had the advantage of being able to select its own battle-ground and make all its

preparations in advance and in secret, the strength of a well-organized defence was such that in no case did these attempts on either side succeed in effecting more than the capture of some point of tactical advantage at a sacrifice of life out of all proportion to the objective gained.

Perhaps Tanks, a British invention, might have been more successful had they been used in sufficient numbers. The Battle of Cambrai in the autumn of 1917, where for the first time they had a chance of proving their mettle, was certainly an exception. As far as it went this was an unqualified success. But the scale was small, the winter fast approaching, the advantage not exploited, and a few days later all our gains were converted into losses.

A far nearer approach to some decisive result occurred in the spring of 1918 when the defection of Russia gave Germany a great superiority on the western front. The stupendous series of offensives which she then launched did succeed in penetrating deeply. But here once more the dominating influence of materiel can be traced. A chief reason why these attacks came to a standstill was that it proved impossible for supplies to keep pace with the advance of the troops.

Although hailed by Germany as great victories and regarded with dismay by the Allies, these operations led nowhere and proved the final undoing of Germany. The morale of her people, who had been taught to expect great results, was undermined. The formidable Hindenburg Line was smashed in a great British attack led by tanks. Leadership once more had play and the Allies under Foch and Haig advanced from one victory to another. A steady and continuous pressure, combined with the defeat of Turkey in Syria, the capitulation of Bulgaria and the collapse of Austria, caused Germany to sue for peace.

Throughout the long years of trench warfare strategy had been paralyzed. The dream of victory by means of massed men and massed guns invariably turned into a nightmare, and in the end it was the psychological factor

TRENCH WARFARE—GENERAL OUTLINE 39

rather than the physical which brought the World War to a close.

* * * * *

It will be readily grasped, even from this brief survey, that the Quartermaster General's branch of the staff, which had to meet the manifold needs of our armies and distribute among them the twenty-five and a half million tons of materials landed in France by the time of the Armistice¹, played a far more predominant rôle than in any previous conflict; and among Q.M.G. services there was none where development was so marked as in those administered by the Army Ordnance Corps which, with few exceptions, had to supply and maintain in a state of efficiency the vast array of paraphernalia that the General Staff summoned to its aid, and to arm, clothe and equip the great armies that we called into existence. Of the orders issued by the Q.M.G. staff 70 per cent dealt with Ordnance subjects.

The materials that absorbed the energies of the Corps can be divided into three main groups; those intended to destroy or demoralize the foe, those designed to counter his similar attempts, and those needed to keep the troops in health and spirits during their abnormal life in the trenches.

These are subjects the fringe of which can only be touched; to describe in any detail the new types of gun and ammunition would alone occupy a bulky volume. But some brief mention of matters that so vitally affected the work of the Ordnance must be attempted, and this can best be done by giving typical examples.

Of these by far the most important was the immense development of heavy artillery. The armament of our Expeditionary Force in the autumn of 1914 comprised the following:

13-pr. Guns	30
18-pr. Guns	324
4.5 Howitzers	108
60-pr. Guns	24

¹ They are given by categories in Appendix I.

THE WESTERN FRONT

By 1918 the figures for ten times as many divisions were:

<i>Guns</i>		<i>Howitzers</i>	
6-pr.	766	4.5-inch	984
12-pr.	10	6-inch	1046
13-pr.	310	8-inch	240
3-inch	106	9.2-inch	224
18-pr.	3215	12-inch	66
60-pr.	456	15-inch	6
6-inch	152		
9.2-inch	16		
12-inch	4		
14-inch	2		
		<i>Mortars</i>	
		Of various types	3022

A number of the larger species of gun and howitzer were on railway mountings.

This mass of artillery consumed ammunition on a scale which beggars adjectives. During the last three months of 1914, shipments overseas amounted to 7131 tons; at the time of the Armistice there had been landed in France well over five million tons, and during the operations at Passchendaele, in the autumn of 1917, the expenditure amounted to 465,000 tons valued at £84,000,000. The amount expended in our South African campaign was in its time without precedent; but now the weight of metal fired in a day might exceed the whole of what was consumed in the thirty months' duration of the war in South Africa.

Besides the Vickers machine gun the Lewis, far lighter, was introduced for infantry and the Hotchkiss for cavalry. In 1914 the arrival in France of a dozen machine guns was an event to be heralded, in the Somme battle the casualties alone amounted to 2889. The anti-aircraft gun was another novelty, and machine guns were fitted with special mounts and sights to tackle low flying planes.

Although the Air Force and Tank Corps provided their own technical equipment, the Ordnance had to supply aircraft bombs, keep tank guns in order and supply all ordinary clothing and equipment for both Corps.

The earliest trench missiles of 1914 were improvised, ironworks situated in the industrial area we occupied

TRENCH WARFARE—GENERAL OUTLINE 41

proving very useful for casting mortars and bombs. At that time the Corps was quite inadequately represented at the front, but fortunately there were companies of Royal Engineers present to help, though many of the extemporized products were almost as dangerous to friend as to foe. It may be noted in passing that the first demand for anything of this sort made on the Ordnance was for a quantity of elastic to make catapults. Afterwards mortars and bombs were made in the Ordnance base workshops and many experimental types provided from home; the day being eventually won by the Stokes mortar, which combined simplicity, speed of fire and reasonable safety.

In March 1915, 48 Mills grenades were sent out for trial, and so successful was this type, that it became the standard, both for throwing by hand and for discharge from a rifle fitted with a cup. Many other sorts however remained in use, and grenades were expended by the million.

There were specially accurate rifles fitted with telescopic sights for snipers, others of high power to smash loop-holed plates, and shot guns to deal with carrier-pigeons that fell under suspicion. Periscopes were of many patterns, both of plain glass and prismatic; and high-powered telescopes were used at selected observation posts.

When attacks were in preparation, there would be great concentrations of special battle stores in the projected zone of operations; tens of thousands of wire-cutters and of wire-breakers that were fastened to the muzzle of the rifle; thousands of flares and daylight signals or panels to be stretched on the ground for signalling to aircraft during an advance, smoke candles to give off a concealing cloud should the wind be favourable.¹ To carry forward grenades, bombs, rations, etc.,

¹ The importance attached to even the most trivial of these adventitious aids is exemplified by the following tale.

On the eve of the battle of the Somme General Rawlinson called to see the Quartermaster General and expressed his anxiety because a particular flare had not reached his Army. I was sent for to explain the situation

in the attack, Yukon packs and tumplines were introduced by Canadian troops—popular in some divisions, but not in others who preferred canvas bags and buckets or special waistcoats fitted with pockets. Pack-saddlery would be in great demand at these times and canvas gun-ammunition carriers to be placed over riding saddles; for wheeled transport could not traverse the shell-pitted ground gained in an advance.

A few only of the most important new adjuncts for offence have been here enumerated; there were many that were passing fads, no sooner tried than discarded. The type of warfare was so novel that no suggestion could be ignored so long as it seemed practical; it was impossible to say what might not prove of use without trial. In the summer of 1915 no raid could take place without daggers, and the base Ordnance workshops were kept busy making stabbing knives by the thousand. But the British soldier did not take kindly to such a treacherous weapon and the next fashion was the knob-kerry, a truncheon studded with frost-nails for horse-shoes. The most expensive failure was the Lewis gun hand-cart. The General Staff looked on the provision of these for the Somme battle as a matter of the utmost importance, and they were rushed out from home just in time to take part in the attack without preliminary trial. No sooner were the carts issued than every regiment promptly discarded them, the loaded weight being more

which was as follows:—Being unable to get any definite news of their arrival, an officer of the R.F.C. had flown to England to make enquiries from the Ministry of Munitions. The official who dealt with this branch of work expressed his surprise, saying he knew of no hitch and believed they had been delivered; but he promised to make enquiries and give a definite answer the next morning. When the officer returned the following day he found the individual he was to interview had been conscripted in the interval! He then went to the War Office and, in view of the urgency, managed to obtain his instant release. All this trouble however was to no purpose. A special chemical ingredient required to produce a particular colour had, it seemed, been wrongfully used and a further supply was not to be had. The operations had to take place without this flare which was only one among a number composed of different coloured lights, the rest of which had arrived safely in France.

TRENCH WARFARE—GENERAL OUTLINE 43

than the gun-team could drag. This experiment cost half a million sterling and earned a mild reproof from the War Office.

Turning next to measures of defence, the greatest novelty, and that which most affected the work of the Corps, originated in the German gas attack of April 1915. This affront to civilization caused consternation, and instant means of protection had to be found. The earlier respirators or smoke helmets required frequent chemical treatment, involving the installation of a novel type of Ordnance establishment on the lines of communication. New and more effective types continually appeared, besides which there were other appliances to be furnished, horse helmets and covers for carrier-pigeon baskets, spraying apparatus and fans to drive away gas, strombos horns and rattles to give warning of an attack, and vacuum bulbs to catch samples for testing when it occurred. Special clothing had to be provided when mustard gas came into use, and fireproof clothes as a protection from flammenwerfer. Moreover measures of retaliation led to the introduction of a whole range of new projectiles filled with chemicals—lethal and lachry-matory.

Of equal importance with the gas mask as a life-saving device was the steel helmet first tried in 1915, every man at the front being provided with helmet and respirator as soon as enough were forthcoming. Body armour was also worn in trench raids and Japanese necklets made of silk were even tried.

Camouflage, another new service, involved the provision of immense quantities of paint and canvas, the painting of guns in stripes and blotches, the staining of tents with kutch and the supply of black or white overalls for raids in the dark or snow.

Among miscellaneous items may be mentioned gloves for handling barbed wire, covers to protect the breech-mechanism of the rifle from mud, ear-drum protectors for gunners, trench stretchers, and electric torches—the consumption of which was enormous for they were extremely handy, not only at the immediate front but in

areas further back where no exposed light was permissible. There were, besides, wagons to be fitted up as portable carrier-pigeon lofts, and bombs to carry messages fired either from mortars or by a rocket apparatus.

In 1914 our artillery alone, besides the Signal Corps, had a small telephone outfit, but infantry were soon afterwards provided for and no sooner did warfare become stationary than the whole front began to be covered with an ever-increasing network of lines. In fact the supply of cable and telephones never overtook the demand, and the plan was eventually adopted of allotting what arrived to Armies who in turn had to distribute to the best advantage. The Signal Corps experimented with numberless new types of apparatus and wireless, the work of supplying which was helped by the establishment, alongside the Ordnance base depot, of a Signal Park which distributed this very special equipment to its own units.

Except for ammunition, no category of commodities approached in bulk to sandbags. These, with barbed wire, spades and shovels, were in great request immediately warfare became stationary, being sent in the autumn of 1914 to Boulogne with ammunition and distributed from ammunition railheads. But soon afterwards advanced R.E. Parks were formed to hold stock of trench materials in forward areas, to which they were consigned instead. Demands for sandbags increased by leaps and bounds and, to supplement supplies from home, large contracts were placed in France. It was thought at the time that a feat had been accomplished when a firm of sack-makers at Flixecourt undertook to furnish 30,000 a day; later on the consumption was at the rate of a million in 24 hours, and on one occasion, in 1916, 10 million were sent to the front in four days.¹

¹ Without intending for one moment to belittle the invaluable work of the women of England when directed into proper channels, it must be owned that private gifts of sandbags and other articles addressed to individuals or regiments became a positive burden to handle in France. Eventually an order had to be published forbidding applications from being sent home. The following report of a battalion commander, supplies the clue:

TRENCH WARFARE—GENERAL OUTLINE 45

The third category of commodities for which there was an increasing demand as the war dragged on its weary course comprised those concerned with welfare. Although, owing to the care given to sanitation and prophylactics, there was no great scourge of disease such as has usually accompanied warfare in the past, the percentage of wounded was high. Innumerable hospitals, casualty clearing stations, ambulance trains, hospital ships and barges, and convalescent institutions were equipped with every modern convenience.

By degrees also many of the amenities of a civilized city came into existence to mitigate the hardships of life in the trenches—clubs, rest houses, entertainment halls, cinemas, canteens, and schools of instruction, besides laundries, baths and even soda-water factories. Some of these were self-supporting; but numerous others were furnished by the Ordnance, mainly from articles made in its own workshops. In addition large auxiliary armies of British women, labour both white and coloured and prisoners of war had to be accommodated and clothed, each type under its own special scale.

Winter clothing, blankets and horse-rugs had to be

“I do not see how it is possible to prevent men writing home to their own friends and asking for socks and shirts. That is a private matter which does not concern a Commanding Officer. This is my second winter in France, and I have no hesitation in saying that the promiscuous distribution of comforts, in the way of clothing, to the troops from irresponsible people at home, is nothing more or less than a nuisance to a Commanding Officer. I have never found any difficulty in getting sufficient shirts or socks for my men from the proper source.

In my opinion a good deal of the complaints come from men who want to give the impression that they are suffering untold hardships. The forms issued by ‘Queen Mary’s Guild’ are in themselves a danger. There are many Commanding Officers who find themselves unable to resist the temptation of saying they want shirts and socks, if it is a matter of filling up a form. They do not pause to consider what they are going to do with them when they arrive. I frequently get parcels of shirts and socks sent from various charitable institutions; in acknowledging them the tendency is to say that they were greatly appreciated by the men, one might go so far as to say they were badly needed in order to appear grateful. This gives rise to the impression that the War Office are guilty of neglect. In reality one would like to say that they were an incubus and not required.”

stored and renovated during the summer months—great-coats, fur-waistcoats and leather jerkins, sheepskin-lined coats for some, mackintoshes for others, fingerless and woollen gloves, thigh gum-boots for the trenches and short gum-boots or field boots for muddy horse-lines.

At the time when our retreat was stayed on the Marne, the Commander-in-Chief had wired home asking for a supply of clothing for officers, many of whom had lost their kit and were in rags ; and some hundreds of jackets, caps, shirts, etc., of officers' patterns were hastily purchased and sent out. This new development proved most popular ; by degrees every requisite that an officer might need was stocked for sale at officers' shops.

An important improvement, first tried in the autumn of 1916, consisted in the addition of a collar and flap to the rectangular ground sheet, converting it into a very serviceable waterproof cape of the pattern now in use.

Among miscellaneous items may be mentioned disinfectors for de-lousing clothing, primus stoves and hot-food containers for exposed situations where a fire could not be lit, navvies' foot-plates to save the boot in digging, fly-traps and mosquito curtains ; and, for the horse, chaff-cutters, corn-crushers and forges—for cold shoeing, the only method contemplated in war, proved unsatisfactory.

Further, all this gear needed extra transport, each division being given a train of blanket wagons ; and as horses were none too plentiful they were reinforced by thousands of bicycles.

The war, so far as concerns the supply of materials, can be divided into two phases, each with its own features. The first, which roughly speaking lasted till the end of 1915, was a period when man-power was plentiful and munitions scarce. In the second there was an abundance of munitions but a constantly increasing scarcity of man-power and a shortage of shipping that gave rise to very great anxiety.

TRENCH WARFARE—GENERAL OUTLINE 47

During the first of these two epochs, when the strength of our forces in France rose from 160,000 to a million and was accompanied by an enormous expansion of artillery, there was the gravest difficulty in furnishing every species of technical equipment. The more domestic class of commodity provided by the D.E.O.S. under the Quartermaster General at the War Office poured out to France with the most wonderful regularity; despite the constantly increasing demand it was rarely that there was any shortage, even temporary.

But guns, ammunition, machine-guns and rifles, provided by the Master General of Ordnance, were far more difficult to get. Before work could begin on a greatly extended scale munition factories had to be built, machinery made and hands trained; and even then, with the constant cry for more artillery, work at home was concentrated on the production of new batteries rather than on the making of the spare parts and adjuncts needed to keep them in action and replace breakage; which moreover did not figure in the statistics of output on which munition factories prided themselves. Batteries would arrive without even the implements to set their fuzes; and our workshops, besides their legitimate work, had perforce to manufacture on a large scale every kind of gun-fitting. To this the War Office took exception, fearing that damage might result; but the Commander-in-Chief's retort was obvious, that this action on the part of the Ordnance had enabled hundreds of guns to keep their place in the line without any accident resulting. To this argument there was no possible reply but to acquiesce and promise to try and speed up supply from home.

But the wastage was extremely heavy, and although supply in time improved, there was never a plethora; the inevitable result being that batteries illicitly hoarded articles such as dial-sights which they knew might be difficult to replace at a moment's notice. The Ordnance was always between the horns of a dilemma in such matters; an overplentiful supply led to wastefulness, while stringency encouraged miserly habits.

Far more serious was the shortage of gun ammunition during 1915, for here self-help was out of the question. The expenditure of every single round had to be checked, and there was no option but to be niggardly and hoard the very scanty stock.

A matter of serious concern to Lord Kitchener was whether the departure of his newly raised Armies might not be delayed for want of rifles, rumours reaching him that they were being used to make dug-outs; and, although denied officially, it is beyond question that Kitchener was in the right. Every reinforcement arrived at the front armed, and the rifles of casualties, that should have been returned to the base, were apt to be scandalously misused, even to the extent of being employed as flooring for trenches.¹ Rifles were so hard to come by that they had to be largely withdrawn from troops other than infantry and cavalry at the front and supplemented by an inferior type without cut-off got from America; while quantities of .256 rifles and ammunition were imported from Japan for the Home Defence Army. Finally, at the urgent solicitation of the War Office, the Commander-in-Chief was reluctantly compelled to agree to accept unarmed drafts, pools of rifles being formed in France for issue to reinforcement camps. It was not till the end of 1916 that supply really overtook demand.

However our troops never actually suffered from the want of rifles. The shortage of machine guns (there were but two per battalion) was what really mattered. In December 1914, when it was decided to double the scale, the stock in France amounted to 23; and it was long before effect could be given even to this modest demand, which was very far from representing finality. Germany alone had realized the immense power of the

¹ Such slackness was there at this period in salvaging materials, even of such primary importance as arms, that, when it was decided to re-arm the 1st Canadian Division with our service rifle, the number asked for was comparatively negligible. The Ross rifle with which the Canadians were armed, though excellent as a match weapon, was not fit for the rough work of trench warfare; the men had lost confidence in it and most had already managed by hook or by crook to re-arm themselves.

TRENCH WARFARE—GENERAL OUTLINE 49

light automatic weapon with which our troops were in comparison so sparsely provided ; and in the first years of the war we were as grievously handicapped by being unable to reply to the stream of bullets poured forth from the enemy's machine gun emplacements as in being unable to retaliate when his artillery shelled our trenches.

By 1916 initial difficulties in the making of munitions were being overcome and an altogether fresh set of problems had to be faced.

Ammunition began to pour into France in such volume that the difficulty was to know where to put it ; to stop the flow would have checked manufacture and vast stocks had to be accumulated in preparation for attacks. High explosive shell and bombs had never before been held in any quantity, early designs of ammunition depots proved to be dangerously constructed when subject to air raid, and numerous fresh ones had to be built spread over immense tracts of ground. The types of new ammunition were many, and their fillings subject to deterioration. Constant examinations of stock were necessary owing to defects discovered in what had been made at some one or other munition factory during some particular period, or from some particular batch of ingredients.

Guns, also now more plentiful, were beginning to show signs of wear and records of their probable lives were required so that programmes of replacement might be framed well in advance.

This plenitude of munitions coincided with a shrinkage of man-power. Every fit man who could be spared was wanted at the front and the Corps was shorn of much of its best materials, its ranks being filled by disabled soldiers and weaklings and reinforced by the Women's Auxiliary Army Corps, thus adding to its difficulties.

Towards the close of 1916, at the time when the seasonal beet traffic was at its height, the overworked French railways in our area were on the verge of a breakdown that threatened to end in complete paralysis, for trouble of this sort accumulates with intense rapidity. An even more serious matter, though one perhaps not so instantly

pressing at that actual moment, was the continual loss of shipping from the activity of enemy submarines. It was useless to have the world's markets at our disposal if we had neither the ships to bring their produce home nor the railways to carry them in France.

This deficiency reacted in other ways; it delayed the discharge of ships, and resulted in the accumulation at ports in France of many tens of thousands of tons of gun cartridge-cases and packages badly wanted by munition factories for refilling. In fact traffic of all sorts threatened to come to a standstill unless prompt remedies were applied.

To cope with this problem Sir Eric Geddes, a great railway organizer, was sent out to inaugurate a Directorate of Transportation, which was not only a Directorate but a fourth branch of the staff, relieving the Q.M.G. and I.G.C. of all work in connection with shipping, ports, docks, rail and waterways.¹ From this time onwards strenuous endeavours were made to create new base depots inland; and although these schemes had not all matured by the end of the war, they resulted in the evacuation of very valuable Ordnance premises in the docks, so as to speed up transit work and enable ships to be turned round with the utmost despatch. This resulted in new arrangements for clearing cargo; very intricate programmes of tonnage had to be prepared both for sea and inland transport, and at periodical conferences held at G.H.Q., the Director General of Transportation, in conjunction with Q.M.G., G.S. and the Directorates concerned, would decide how such ships, railway trucks and barges as were available should be allotted between

¹ It would have been more logical to make the new Directorate responsible for *all* transportation, including carriage by road; but this would have entailed an immense upheaval of our existing arrangements. To constitute it a fourth branch of the Staff, however, independent of the Quartermaster General, was I believe a mistake. While the arrangement worked well enough so long as the deadlock continued, it broke down under the stress of the great German attack of 1918. From the spring of that year onwards the Q.M.G. became once more responsible for all transportation services.

TRENCH WARFARE—GENERAL OUTLINE 51

stores and clothing, ammunition, food, road and building materials, etc.

The constantly increasing scarcity of shipping and man-power combined to bring the conservation of materials very prominently to the fore, the urgency of the problem being accentuated by the insatiable demands for materials of all sorts in trench warfare, the world-wide shortage of all primary products and enormous losses caused by submarine attacks. This was a business for which the A.O.C. was responsible during peace, when regimental economy depended on checks applied by the administrative departments of the army. But with the advent of war, the customary checks perforce went to the winds, a unit had only to certify that the clothing or equipment indented for was needed to replace wastage, to receive practically any quantity it might choose to demand ; and this was a certificate most officers would put their names to with a very light heart. In our small and well cared for voluntary army the regiment had small occasion to study the bitter lesson of economy, it was nurtured by others ; and now that this outside restraining influence was withdrawn and our army composed so largely of temporary soldiers who had first to learn to use their weapons and how to fight, it is not surprising that gross extravagance was apt to prevail. Responsibility for economy now fell in fact on the shoulders of the consumer, in the prevention of waste regimentally ; though divers rough and ready checks were adopted to enable the Ordnance to curb extravagant demands.

Of equal importance was the gleaning of derelict materials on the battlefield or from abandoned camps and billets. According to our War Manual the clearing of the battlefield was the duty of the Adjutant General's branch of the staff, but the instruction was really intended to apply to the succour of the wounded and burial of the dead. When the salvage of materials became so important, it was naturally on the Q.M.G. staff that the duty fell ; and a new organization was brought into being, with a Controller of Salvage at G.H.Q. who, in conjunction with a similar official at home, dealt with

general questions of policy, and a small nucleus crew with each formation to supervise the gleaning.

One reason for creating this new establishment was that salvage covered every species of material, another that the regimental officers and men who were employed received a lower rate of pay than those of the A.O.C.; but in reality the policy was penny wise and pound foolish, seeing that existing organizations only needed expansion to deal with the harvest. Probably 90 per cent of what was worth retrieving comprised Ordnance stores and ammunition, and it would have been better to entrust their collection to the D.O.S. In practice it proved impossible to cut Ordnance representatives at the front adrift from the work, especially when it came to dealing with ammunition. It was they who were the experts and into whose hands what was collected had eventually to come; and it was they who, from their records of what had been issued, could tell where waste was occurring. The result of setting up this independent organization was never satisfactory; it created a divided responsibility. Hardly two formations had similar salvage schemes, and the extent to which operations were successful depended in the main on how far the formation made its Ordnance Officer responsible for the work.

By the end of the war salvage had become quite a cult, notices of the quack advertisement type were to be seen—"what have you salvaged to-day"—and a Salvage club was started in England whose magazine discussed subjects such as rat destruction or how best to use up kitchen refuse. *Punch* even had its joke, the picture of a child holding by the tail a tabby in the last stage of decay and saying, "Mummie, I've saved a perfectly good dead cat."

Another result of the shortage of shipping was that as many services as possible were concentrated in France. Special workshops were set up to deal with the heavier class of repairs to artillery equipments and ammunition hitherto carried out in England, and a number of extra hospitals and convalescent camps were installed.

The last event that need be chronicled was the

TRENCH WARFARE—GENERAL OUTLINE 53

creation of a Supreme High Command among the Allies in the spring of 1918, at the time when American troops were beginning to arrive. This made it possible to reinforce any threatened point from an international reserve, and portions of the front were actually held by Corps and divisions of three nations whose arms, ammunition, equipment and uniform were not interchangeable. However sound the appointment of one Generalissimo to co-ordinate the whole of the operations, there can be no doubt that the mingling of French, British and American troops added considerably to the difficulties of all engaged on maintenance services and of none more so than their respective Ordnance Departments.

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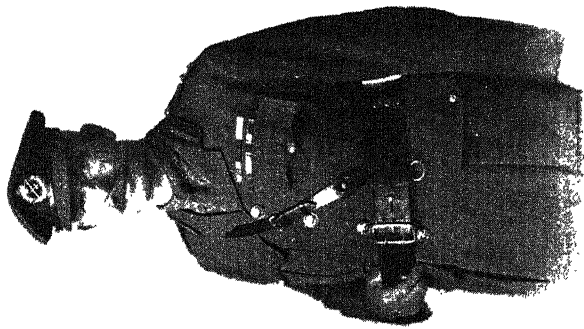
It will be seen from this review that in many ways conditions in 1918 were in sharp contrast to those of 1914; and though the arrival of a plentiful supply of munitions relieved the Corps of a great load of anxiety, other factors combined to make its burden very much heavier.

To say that our Expeditionary Force of 6 divisions became 63 divisions formed into 20 Corps divided among 5 Armies conveys a quite inadequate idea of the growth of Ordnance work, which increased not only numerically but functionally.

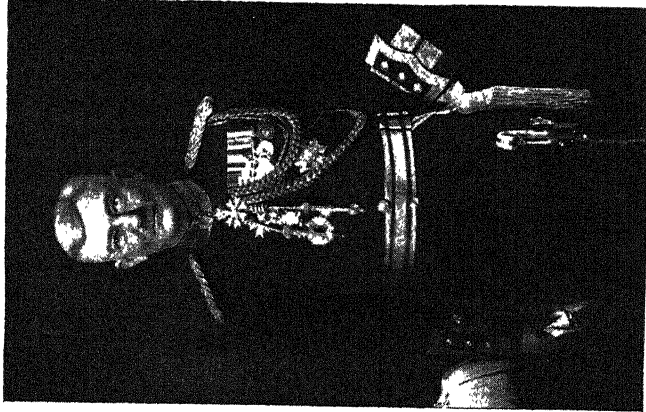
For this the chief cause was the immense use made of artillery; an unmistakable lesson of the war being that the modern gun cannot keep the field without well equipped workshops close at hand at which it and its carriage can be periodically overhauled and adjusted. Equally, the war proved that those who have to look after ammunition require technical training. The rate of fire possible from the modern gun is so great that huge reserves had to be kept; the types of ammunition were many and intricate and, unless cared for by specialists, it was bound to suffer damage, deteriorate, and become so inaccurate that to fire it from a gun might be a sheer waste of money.

But the care of guns and ammunition were only two

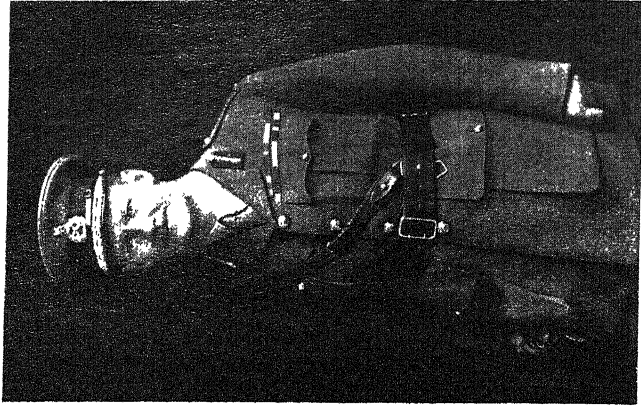
among many directions in which there was a great expansion in Ordnance work owing to the increased complexity of military equipment. So numerous did its ramifications become that the work of the Corps can best be described by dealing in separate chapters, first with the parent stem at headquarters, next with the offshoots at the front, thirdly with the roots on the lines of communication, and lastly with the branches connected with ammunition supply, which had a semi-independent organization.



MAJOR GENERAL SIR H. W. PERRY,
K.C.M.G., C.B., C.S.I.
(also D.O.S. Gallipoli and Mesopotamia.)



MAJOR GENERAL SIR H. D. E. PARSONS,
K.C.M.G., C.B.



MAJOR GENERAL SIR C. M. MATHEW,
K.C.M.G., C.B., D.S.O.
(also D.O.S. Salonika and Mesopotamia.)

CHAPTER III

HEADQUARTERS

THE staff of the Director of Ordnance Services, consisting in August 1914 of one Assistant Director, one officer as chief clerk and five other ranks, rose before the end of the war to 29 officers and 170 others, of whom 45 were women. The first substantial increase occurred when General Parsons relieved Perry as Director and divided the office into four branches: one to deal with stores and ammunition, another with clothing and Indian affairs, a third with personnel, and the fourth with workshops and the technique of artillery materiel.

Our war organization provided that either the Director should be at G.H.Q. with a Deputy under the I.G.C. or vice versa, and General Robertson, who was at first Q.M.G., elected to have Deputies with him for his supply services, leaving the Directors on the line of communications; his reason presumably being that it was there that the bulk of their work lay. It was to the I.G.C. that they had to turn for assistance in the installation of their depots and rail or shipping matters. But there was this grave disadvantage; the D.O.S. was not directly in touch with the Q.M.G. to whom he was responsible for provision and supply, nor with the heads of other branches at G.H.Q. with whom his office should have been closely linked.

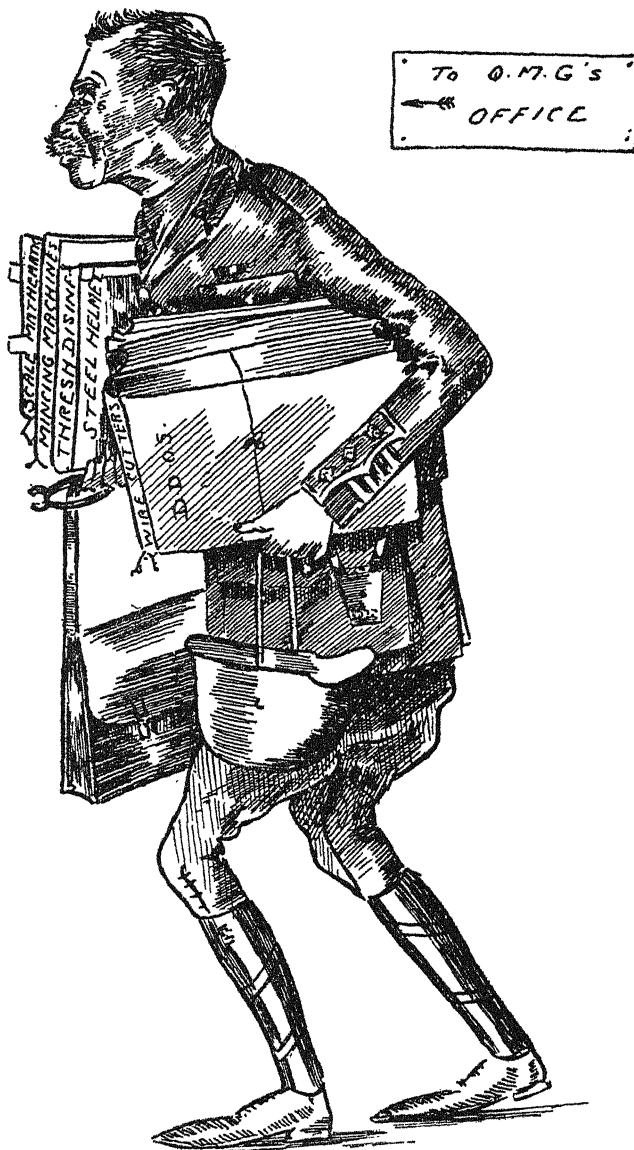
When, at the close of 1914, it was decided to create a second line of communications and form the troops at the front into Armies so as to decentralize administration, the Q.M.G. had an idea of calling the D.O.S. to his side with the title of Director General, and of giving each line a Director to co-ordinate the work in his sphere. This would have rectified matters, but Robertson shortly afterwards became Chief of the General Staff, being relieved by General Maxwell (at that time I.G.C.), who decided to leave matters as they were, except that he agreed to the appointment of a Deputy for each of the two lines of communication soon after formed.

The arrangement worked on the whole well, as indeed anything can be made to work given good will and the right men ; but there is no doubt that it led to much inconvenience and duplication of work.

By degrees G.H.Q. France developed into a second War Office, through which filtered an enormous mass of paper, a great deal of which concerned Ordnance subjects. There was correspondence with the Army Council to be dealt with, applications for new types of equipment had to be considered and the priority of their issue to formations to be settled with the General Staff according to the tactical situation, there were suggestions and complaints from Armies to be investigated, reports to be called for, instructions to be issued and routine orders framed.

All these matters necessarily passed through the Q.M.G.'s office where they were often dealt with by conference and discussion. It was impossible to refer them to a D.O.S. a Sabbath day's journey distant, and the majority had to be thrashed out by the Deputy Director at G.H.Q. who was in reality a staff officer to the Q.M.G. Guns and machine guns were dealt with by one A.Q.M.G., ammunition partly by another and partly by D.D.O.S., and all other Ordnance subjects by D.D.O.S. whose office was divided into two branches—one for ammunition, the other for equipment and clothing. There was at G.H.Q. an experimental equipments committee which, in three and a half months of 1915, dealt with 495 proposals of which 235 were actually tried ; and in May of that year no less than 850 letters and telegrams issued from the office of D.D.O.S. on the subject of gas-masks alone. In fact a very large proportion of the work of the Q.M.G.'s office fell to its Ordnance branch ; and the author, who relieved Colonel Mathew in the post at the end of 1916, would be closeted daily with General Maxwell, who disliked delegating authority, for hours at a stretch getting his signature and decisions to papers. The length of these interviews, indeed, was a byword.¹

¹ What a large portion and variety of the work of the Q.M.G.'s office fell to its Ordnance branch can be gauged from Appendix II.



Then, the policy being settled, its substance was communicated by D.D.O.S. to his Director who had actually to find what the army wanted, and on whom the real brunt of the work must fall. The D.O.S. had to set the wheels in motion, arrange for supply, and settle all details in conjunction with his departmental subordinates at the front and on the lines of communication. But if, as not infrequently happened, there was some further point to be cleared up, the D.O.S. could not go straight to the fountain head. He must address his enquiry to D.D.O.S. to get the difficulty straightened out in consultation with whatever branches of G.H.Q. were concerned.

Moreover it was in practice impossible to draw any precise line between policy, a matter for G.H.Q., and its method of execution, a matter for the D.O.S. and his chief, the I.G.C. ; and the attempt to do so led to misunderstanding and even sometimes to delay. The Q.M.G. and I.G.C. were to be found addressing the Army Council on the same subjects ; the War Office was in the same quandary, writing almost indifferently to one or other on Ordnance subjects, and it was only a very close and whole-hearted cooperation between the offices of D.O.S. and D.D.O.S. that enabled work to be carried on¹. But for the telephone indeed the situation would have been well nigh impossible ; messages such as the following constantly passing—"I see the stock of such and such a nature of ammunition is getting low, are you taking steps to hasten supply or am I to do so ? "

¹ Three consecutive extracts from the diary of Colonel Mathew when D.D.O.S. G.H.Q. will suffice as examples.

20.9.15. Spoke Q.M.G. about a protest from A.G. about a memorandum issued by D.O.S. to his representatives with Armies giving the present policy in regard to issues of smoke-helmets. Pointed out that D.O.S. had submitted his proposed memo. to A.G. through me and that A.G. had agreed.

21.9.15. D.O.S. wrote me pointing out that G.O.C. 1st Army had ordered withdrawal of rifles from all stretcher bearers. I am asking G.S. if this has their approval and if the principle should apply to other formations.

Drafted letter to W.O. asking that letters on provision and maintenance be addressed to H.Q. L. of C.

Far better would it have been to have adopted the War Office type of organization where the Director, besides being the chief of his Department and Corps, was also a staff officer to the Q.M.G., in direct touch with other branches of the staff, the head of the artillery, engineers, medical service, etc. Separation of the two functions, the one conducted at St. Omer and the other at Abbeville, could not fail to result in occasional tangles and a general waste of time and labour.

This continued till the beginning of 1917, when the Directorate of Transportation was formed and installed in the neighbourhood of G.H.Q., by then at Montreuil. Relieved of all matters concerning ports and docks, railways and shipping, there was little left for an I.G.C. to do. The post was superseded by that of G.O.C. L. of C. area with no duties but those of command, and the D.O.S. was left stranded high and dry. It was then at last decided to move his office to G.H.Q., and this entailed a reorganization. Naturally the Q.M.G. would not wish to consult a Deputy with the Director close at hand, but for him to wipe out of existence the Ordnance establishment housed with him under the same roof, an important integral part of his office, was unthinkable. The machinery was running smoothly and suddenly to throw it out of gear during the crises of a world conflict was out of the question. Moreover the D.O.S. was by this time accompanied by a large train of officers and clerks whom it was impossible to lodge within the precincts of the small township of Montreuil.

The problem was solved by a compromise. The D.D.O.S. with a small portion of his staff joined his Director who occupied the Chateau L'Epinoy and hutments at Wailly five miles to the south, relieving the Q.M.G.'s office of some part of the work. Two Deputy Q.M.G.s were at this time appointed in place of one, for there were now problems to be dealt with previously referred to the I.G.C., and each of these supervised the work of one of the two branches of the late D.D.O.S.'s office; Lieutenant Colonel Fernyhough and Major

Cunningham at the head of these branches being converted into A.Q.M.G. and D.A.Q.M.G., the first occasion on which officers of the Corps were given the title of staff officer.

The office of the D.O.S. was now reconstituted into four fresh branches, each under a Deputy. One dealt with guns and ammunition, the second with other stores and clothing, the third with personnel and establishments, and the fourth with technical artillery matters and workshops. The distribution of duties is made abundantly clear in Appendix III, and only calls for elaboration as regards the more scientific side of the work.

In peace, the duty of the mechanical engineering branch, as regards the care and maintenance of artillery equipment, was confined to inspection and repairs or modifications approved by the War Office. During the war this limitation was found to be impossible, local initiative became imperative. On the one hand pre-existing types of equipment displayed faults that had never been detected in peace, when a six-gun battery would fire in a year less rounds than a single piece would now fire in a day ; while on the other new types of heavy gun and howitzer, which there was no time to test thoroughly, developed many defects.

As these weaknesses came to light they were reported home, but in the meantime remedies were applied ; designs, working drawings and materials being provided locally. One new siege equipment underwent some 150 modifications, all tending to improve its efficiency, the majority of which originated in France. Here was an instance where Parsons' foresight and experience in South Africa proved particularly valuable, one of his first steps having been to attach Colonel Paul, a talented designer, to his office as mechanical engineering adviser. Paul framed periodical reports which covered the whole technique of artillery materiel, and Mr. Lloyd George, then Minister of Munitions, who hated and impatiently brushed aside all formalism, happening to see one of these reports, invited Paul early in 1916 to pay him a visit.

From this there resulted a very close contact with the Ministry which was of great service ; we explained our difficulties through the mouth of an engineering officer, one of Paul's assistants who paid periodical visits to England, and at the same time found out what was happening there. This branch of the D.O.S. office had a large drawing and designing staff, and eventually a small experimental shop was formed for making and testing new devices, where also two specialist officers attended to the highly intricate height-finding instruments used against aircraft.

Another branch of engineering work, which became of increasing consequence as the war progressed, consisted in the preparation of vital gun statistics. During 1917 some 34,000 measurements of bores were taken, as a rule periodically though sometimes specially to co-relate peculiarities of wear with the occurrence of premature explosions. These measurements were analysed and charted, a card index being kept showing the statistical history of every gun from the day it was landed in France. By this means alone could accurate forecasts be prepared to show what number of each nature would require replacement in any particular period owing to wear and erosion. The diagrams also furnished information of high value to designers, exhibiting remarkable variation in the lives of some guns compared with others ; and showing how the life differed according to the nature of propellant, that with the highest percentage of nitroglycerine (giving the highest temperature) resulting in the speediest wear. Many curious facts came to light from these graphs, such as the tendency of our guns to wear oval. Some natures recovered but in others the ovality increased, when it was erosion rather than wear that ended their lives.

A similar development occurred in the case of ammunition, the technical side of which, in the D.O.S.'s office, was in charge of Lieutenant Colonel Stokes, another highly scientific officer. There were innumerable new types, many of which developed defects ; but of course in this case the fault could seldom be rectified in France.

The question was usually one of improving the design for future manufacture. Here also a very close liaison was established with designers, by means of which we brought to notice what was wrong and gained knowledge as to new types shortly to arrive.

All this business, however, opened up an unexpected issue to explain which involves a short digression. A peculiar feature of our organization was that of the four military members of the Army Council—Chief of the Imperial General Staff, Adjutant General, Quartermaster General and Master General of Ordnance—the last named alone was not represented outside the War Office and its manufacturing branches either in peace or war. For this seeming anomaly there had been quite logical grounds. The M.G.O. was only the designer and procurer of war-like stores; what he provided passed straight into the custody of the Q.M.G.'s branch, under which it was stored, issued and repaired by the Army Ordnance Department and Corps.

During the war, the War Office more than once suggested that the M.G.O. should be represented officially on the headquarter staff of the army in France, but there the idea was viewed askance and opposed. In principle the division of duties seemed ideal. The General Staff framed plans of operation, while the Adjutant General found the men and the Quartermaster General the materials to carry them into execution. It was impossible to conceive a clearer cut division of responsibility. To have introduced a fourth M.G.O. branch seemed like adding a fifth wheel to a coach running so smoothly on four, that it has generally been conceded that no troops were so well administered during the Great War as those of the British Empire.¹

It was only on the subject of patterns of artillery materiel that the weakness of our organization in the

¹ It is true that, largely under pressure from the War Cabinet I fancy, a fourth branch of the staff was formed in very special circumstances to deal with transportation services in the rearward zone. But the experiment was not copied in any other theatres nor was it an unqualified success. See p. 50.

field in comparison with that at the War Office betrayed itself ; a subject which arose out of the special conditions of the war and one it had never been contemplated would require close study in the field during active service.

Included in our war establishments were an Artillery Adviser and Chief Engineer, senior officers of the R.A. and R.E., to advise the Commander-in-Chief on their respective subjects, but with no executive duties. When however trench warfare developed, in which guns and engineering played such important rôles, the functions of these officers expanded immensely and the one clerk with which each started life developed into a substantial body of gunners and sappers.

The Artillery Adviser was rechristened Major General Royal Artillery and his office became part of the General Staff. It was his business to advise as to what types of guns and ammunition we should have, how they should be distributed, to study the tactical use of artillery, the training of gunners and so forth. Being responsible to the C.G.S. for the efficiency of artillery work, he was of necessity deeply concerned if guns shot badly, carriages racked to pieces or fuzes were unreliable.

The D.O.S. on the other hand was equally responsible to the Q.M.G. for the efficiency of what he supplied and had to keep in working order ; whether guns, machine guns or what not.

Herein lay the difficulty. The M.G.R.A. and D.O.S., serving different masters, were both dealing with the same subject independently, the one from the point of view of the user and the other from that of the designer. There was no one in France occupying a position analogous to that of M.G.O. with authority to bring the two aspects into harmony. The difficulty was aggravated owing to the Ministry of Munitions absorbing so many of the functions of the M.G.O. at home and because, in common with much other business of detail, these matters were largely settled through departmental channels and personal contacts with the officials primarily concerned at the Ministry and War Office, to save circumlocution and delay. Full dress letters between the Commander-

in-Chief and the Army Council were usually reserved for matters of high policy needing mature deliberation.

There were several conferences and discussions to discover some formula to solve this problem. Questions of behaviour were to be for the M.G.R.A., those of design for the D.O.S., and each was to send the other copies of his reports. But it was impossible to make any such hard and fast classification. Almost every question of behaviour involved design and vice versa.

Prematures can be cited as a case in point. They might destroy the gun and its crew; it was necessary that the soldier should have full confidence in his weapon, and they were classed under behaviour. But their cause was very obscure; it might be due to the ammunition, the piece or a combination of both. The gunner had quite enough to do in studying new methods of gunnery and fire tactics and looking after his men, and horses too it might be, without attempting to learn about the inside of a new recoil mechanism or fuze. The reports on prematures which the M.G.R.A. received from his officers at the front and transmitted home on a stereo-typed form were couched in such bald terms, merely recording the type of piece and nature of ammunition, that they were of no use to the designer.

It was the Ordnance which skimmed the engineering brains of the new army and had its ammunition experts whose particular duty it was to study such questions and whose reports were of value. To take one example. Early in 1917 there occurred an epidemic of prematures from 6-inch guns for which the M.G.R.A. was unable to assign any reason. But an Ordnance officer, an ammunition specialist, came to the conclusion that the fault lay in the weakness of the creep spring of the fuze which enabled it to arm before the shell left the bore. His opinion was confirmed at home, a stronger creep spring was provided and the trouble ceased.

In this connection the following extract from General Parsons' diary of 9th August, 1917, is worth quoting.

"I had some very interesting unofficial conversation

with Lieut.-Colonel Milman [of the Ministry of Munitions]. He is most anxious to get the earliest information regarding defective ammunition, defective fuzes which cause prematures and so forth. He says that at present all he gets after a considerable lapse of time are the stereotyped reports of prematures forwarded to D.G.M.D. [Director General Munitions Design] by M.G.R.A., and these reports give no useful information as to the nature of the defects of fuzes. What he would like to get are useful reports from the Ordnance ammunition officers as a result of their investigation on the spot.

"I told him that it had been laid down by Q.M.G. and General Staff that it is the M.G.R.A.'s business to deal with all prematures but I would see if I could manage to get detailed reports whenever possible from my own ammunition officers, supplemented by the remarks and opinion of the C.I.O.O. [Lt. Col. Stokes]."

Sir Ronald Maxwell, who was wearing his life away as Q.M.G. with long hours of toil at his desk, did his utmost in conjunction with C.G.S. to find some way out of this impasse without sacrifice of principle. But he could not divest himself of a duty entrusted to him by our organization, turn a Director for whose work he was responsible into a servant of the artillery, and leave it to the M.G.R.A. to decide what action should be taken on the D.O.S.'s recommendations. Though it is obvious that the two hinged together, the M.G.R.A. was no more competent to say whether a carriage needed strengthening and how, than the D.O.S. whether its piece had sufficient power. Nevertheless it is easy to realize that it must have been galling for the M.G.R.A., as head of a most important scientific arm, to have all this work carried on as it were behind his back.

General Travers Clarke however, who relieved Maxwell early in 1918, held very pronounced views as to the duties of a Q.M.G., and quickly swept away all these attempts at compromise. The D.O.S. was thenceforth ordered to deal with any technical defect that came to his notice ; only referring, as in the past, to the Q.M.G. if the matters

were one of major importance. At the same time the Q.M.G. took into his office a senior officer from the staff of the M.G.R.A. to see that the point of view of the user was not overlooked.

But although this action gave the D.O.S. all the liberty he could wish, this drastic way of cutting the knot was not really sound as a permanent principle. Instead of linking more closely together the problems of user and designer it severed such strands as previously bound them together.

It would be easy to exaggerate the importance of this small peck of trouble ; for in every other direction the relations between the R.A. and Ordnance were very harmonious. Indeed, at the front, the gunners were most generous in acknowledging how it helped them to have a body of experts to attend to mechanical defects. The D.O.S.'s office had to grapple with a constant succession of problems affecting the R.E. (the Chief Engineer was affiliated to the Q.M.G. being more concerned with materiel than tactics), the Medical Service (under the A.G.), the Transportation Directorate, and indeed every service. Its relations with all branches were very intimate ; but though opinions might differ, when subjects were regarded from different angles, there was never any difficulty in reconciling divergent views except in this one case.

The incident has been mentioned at this length owing to its bearing on our latest army reorganization of 1928. By including a Deputy Master General of Ordnance among the principal staff officers of a Commander-in-Chief in time of war, this does at least ensure that problems of design are treated from the widest possible aspect—the views of user, repairer and manufacturer being all co-ordinated under one chief—a point the more important now that our army is being so rapidly mechanized.

This weakness in our system would very likely not have been so apparent had the office of the D.O.S. been an integral part of G.H.Q. This remained the great flaw.

Although the move to Montreuil early in 1917 brought him into much closer relationship with the heads of other branches, the D.O.S. was even then not fully absorbed into G.H.Q. The plan, by then firmly established, of dividing the work between the offices of the Q.M.G. and D.O.S. could not have been overthrown so late in the day without great upheaval, and Wailly was five miles distant from G.H.Q. The central office files were not at the disposal of the D.O.S., and his dealings with others were still conducted mainly by means of letters addressed to the Q.M.G.

Policy and its means of execution were still divorced and there was nearly as much duplication as when the D.O.S. served under the I.G.C. on the lines of communication. On almost every Ordnance question that cropped up the Q.M.G. had either to refer to the D.O.S. or else consult some return submitted by him. Every side of the D.O.S.'s office had its counterpart in that of the Q.M.G. which embraced an ever-growing array of brigadier generals, A.Q.M.G.'s, D.A.Q.M.G.'s, staff captains and staff lieutenants with their attendant clerks, all employed on headquarter Ordnance work. The same records had to be kept up in both offices and the number of returns which the D.O.S. had to render to the Q.M.G. became a positive burden.

All this might have been avoided had Sir William Robertson's suggestion in the winter of 1914/15 been adopted. At that time headquarters staffs were still small, no elaborate organization had been built up and there would have been no difficulty in incorporating the office of D.O.S. within that of Q.M.G.

CHAPTER IV

THE FRONT

NOWHERE was the development of Ordnance services so marked as at the front, as one fact alone will suffice to show. The establishment of the Army Ordnance Corps with six divisions at the outbreak of war comprised six officers and six clerks; while before its close a similar force required 37 officers and 336 other ranks.

The highest organization under General Headquarters of our Expeditionary Force—the Army Corps—existed only for the purpose of command, the largest administrative unit being the division. But no sooner was it realized that this force would be greatly expanded, than it became obvious that some intermediary was required betwixt G.H.Q. and the Corps for the purpose of command, or the division for that of administration. For this purpose the Corps then overseas were formed into two Armies in January 1915, a third was added in July, a fourth in April 1916, and a fifth in June of the same year.

The object of creating Armies being to decentralize both command and administration, each was given a staff similar to that at G.H.Q., with a D.D.O.S. among the representatives of Directorates.¹ No instructions were issued defining the functions of the D.D.O.S. of an Army, but very quickly, and without any written order, he passed into the same position *vis-à-vis* his D.A. and Q.M.G. as that held at G.H.Q. by the D.D.O.S. under the Q.M.G.

¹ The occupants of these posts were as follows :

1st Army. Colonel Usher Smith, until August 1917 when, being appointed D.O.S., Salonika, he was relieved by Colonel Forbes. When the latter was appointed D.O.S., Mesopotamia, in March 1918, he was succeeded by Brigadier General Scott from East Africa.

2nd Army. Colonel Hale, who went to the Italian front with his Army Headquarters in the autumn of 1917.

3rd Army. Colonel Moulton Barrett, until January 1918 when, on appointment as liaison officer with the United States Army, he was relieved by Colonel Watts. In the following May Watts went to the War Office and was succeeded by Colonel Tufnell.

4th Army. Colonel Bush.

5th Army. Colonel Hamilton.

At G.H.Q., as has been shown, the staff and departmental functions of the Corps were unfortunately separated, but here they were combined ; the D.D.O.S. being in direct communication with his Director on departmental questions, besides supervising all Ordnance establishments in the area occupied by his Army.

The next step, taken in the autumn of 1915, was due to the shortage of trained Ordnance officers of the regular army. The Ordnance officer with the division was by now a temporary officer, whose work during the first part of his career needed close supervision, and the D.D.O.S. of an Army could not spend his whole day touring from one to another to see that everything was up to the mark. Each Corps was therefore given a minute Ordnance staff under an Assistant Director, the orders being that this officer was to have as little office work as possible and be free to visit the temporary officers serving with his divisions. But no sooner did the front become static than a great change came over our organization. Instead of existing for the purpose of command, the Corps became the main administrative unit, holding semi-permanently a certain sector with a fighting front and a rest area while divisions moved to and fro according to the tactical situation ; and, in point of fact, the Q. staff officer of the Corps was only too ready to hand over to the A.D.O.S. his multifarious correspondence on Ordnance subjects, so that he soon held a position in his Corps corresponding to that of the D.D.O.S. in the Army.

At the front there were numerous " trench stores," such as periscopes, trench-stretchers and gum-boots, handed over from one relief to another ; and further back were permanently equipped billets and camps, baths, laundries and other institutions ; and the A.D.O.S. had to deal with a great variety of subjects.

At the outbreak of the war all fighting units were embodied in the division, and when siege batteries began to arrive they were at first provided for by the D.A.D.O.S. of one or other division. But the number of these non-divisional units, serving directly under the Corps Commander, rapidly increased and Corps Troops Ordnance

Officers were appointed to cater for them. The duties of these officers, under the A.D.O.S. of the Corps, were executive ; and they had charge of such Corps reserves of equipment as were formed. Seeing that Corps Troops might number some seventy units, whose technical equipment was of all kinds and conditions, the O.O. Corps Troops was an essential appointment. Later on Ordnance officers were appointed to fulfil similar duties for Army Troops, who might be even greater in number and spread over a much wider area. In fact there were often two O.O.s Army Troops, and at one time in the 1st Army as many as four, so great was the zone occupied.

Another new establishment was the Officers' shop established during the summer of 1916 in each army area, where stocks of every requisite, from collar studs to field boots, were held. These small Ordnance depots sold goods over the counter ; and most popular they were, dispensing many thousands of pounds worth each in the course of the month. In fact it was always difficult to keep a sufficient stock, so great was the demand.

In the division, the Deputy Assistant Director of Ordnance Services (a cumbrous title always abbreviated into the coined word Dados) combined administrative with executive functions ; and the position of these temporary officers, entirely new to the work, depended largely on their own fibre and that of their general and his staff. In most divisions D.A.D.O.S. was as much a member of the Q. Staff as in higher formations, in others little more than an executant ; and it was very noticeable and natural that, wherever the former was the case, Ordnance services would be the more efficiently administered. Two illustrations will exemplify this contrast in attitude.

The first refers to an inspection by a divisional general who noticed that certain accoutrements were deficient. The explanation given was the stereotyped one that they could not be got from the Ordnance, a reply that would usually pass muster without further enquiry and have no result except to create an impression that D.A.D.O.S. was slack. In this case, however, the G.O.C. adopted the

unexpected course of asking that the indents might be produced for his inspection after the parade. One battalion then discovered that it had forgotten to demand, while in the other two, so-called copies of the indents appeared after some delay. The next day the G.O.C. paid a visit to his Ordnance officer's dump, where he saw a number of the items that were wanting ; he then asked to see what indents were outstanding and found there were none. The documents produced for his inspection the previous day had been forged, and the Quartermasters of the battalions concerned were sent home. Here is a case where the general himself took an interest in matters. Where this was so there would be effective checks against extravagance and waste. An excellent plan sometimes adopted was to have weekly conferences of Quartermasters attended by the Q. staff and Ordnance officer to discuss and smooth out any difficulty.

The next case relates to the refitting of a division which took part in the battle of Loos in September 1915. At midnight a telegram reached Colonel Usher Smith, D.D.O.S. 1st Army, saying that the division had lost *the whole of its equipment* which was to be instantly replaced "without the formality of indents and vouchers." No doubt the officer who sent this telegram thought to over-ride red tape ; but he should have known better. Regimental accounts with their vouchers were abolished on service and indents were nothing more than lists of what was wanted. Usher Smith at once sent off Major Routh Jones, his assistant, to discover the real situation. By routing out the Q. Staff officer of the division and the D.A.D.O.S., and visiting each brigade and unit in turn, it was possible to obtain the true picture by nine o'clock the next morning. And the only important deficiencies proved to be 26 machine guns, 76 bicycles and 5 pontoon wagons, all of which were fetched from Calais by lorry in a few hours. Here was a case of a division with an ignorant staff and a D.A.D.O.S. acting merely as an executant, a result probably due to his own character and want of experience.

Later on such a refitment as this would have proceeded

as a matter of routine. Units had learnt better how to look after themselves and the staff and Ordnance officer had also profited by experience, so that refitments proceeded with a minimum of time and friction.¹

Turning next to the executive side of the work. A special feature was the dump, which, should the division be in a quiet part of the line, might reach substantial dimensions. The dump was the inevitable outcome of stationary warfare, it came into existence automatically and in the circumstances was very useful. Especially owing to the bulk issue system, stocks were bound to accumulate through items being asked for and then, for some reason such as a move or casualty, not wanted. In mobile warfare anything of this sort must have been promptly returned to the base, but now it was kept to meet the next demand. There was consequently always a floating stock of articles of which there was a regular consumption; and some divisions encouraged the expansion of this dump to such an extent that it was very cumbersome to move.

There were different modes of making issue to meet different conditions. Sometimes what arrived from the base would be first distributed to the warrant officers, of whom there was one per brigade and one for divisional troops, and the warrant officer then issued each unit with its share; but where the division was concentrated the whole process might take place at the dump, a refinement sometimes adopted being to allot hours for drawing equipment to each unit.

Although Ordnance officers with formations kept no ledger account, they were required to maintain a record of all the more important items issued or of what was sent up in bulk from the base for distribution, including the floating stock held at the dump.²

¹ Instruction on the subject, issued in the autumn of 1916, are given in Appendix IV.

² A point worth mention is that for long there was no recognized way of keeping this record. Each A.D.O.S. had his own ideas, and every time the unfortunate D.A.D.O.S. moved into a new Corps, he was likely to be told to revise his system. Eventually printed forms were employed, saving much time and trouble.

This record enabled a rough and ready comparison to be made between the care or extravagance of different units, and it was very striking how invariably a high state of efficiency and discipline was accompanied by economy. The smarter the regiment the more care it took of its clothing and equipment.

As time went on and the conservation of materials became so important, records of issues was more carefully scrutinized and made to show what proportion of the articles replaced was returned. To encourage a spirit of emulation, divisions published comparative statistics in their orders of what had been drawn and handed in by each unit, and Armies similar statements to show the degree of care exercised by each of their divisions.¹

The last effort at economy, introduced in the summer of 1918, was to give each formation a weekly ration of clothing and certain other articles. This plan had been tried for three months in one division and found to answer admirably. It gave units an indication of what was a reasonable allowance, and if this fell short a special application could be made; but it was adopted too late in the day to be fully effective.²

Closely connected with this branch of Ordnance work were the repair establishments which, though not officially

¹ As an example of rough-and-ready justice the following order of the Canadian Corps Commander is worth quoting: "In future, indents on Ordnance for mess-tins and puttees will be forwarded to the Base and when the stores are received by the D.A.D.O.S., Units will be notified. Issues will, however, not be made until 90 per cent of the old mess-tins or puttees are turned in. A certificate signed by the Paymaster of the Unit, showing that the value of mess-tins or puttees lost by the men has been deducted from their pay, will be accepted in lieu of the mess-tins or puttees so lost."

² The monthly allowance was as follows:

<i>Per 100 dismounted Men.</i>	<i>Per 100 mounted Men.</i>
Jackets . . . 12	12
Trousers . . . 15	—
Pantaloon . . . —	20
Puttees . . . 12	12
Caps . . . 5	5
Mess-tins . . . 5	5
Ground sheets . . . 4	4

recognized, existed in every formation that took any interest in self-help, sometimes on a Corps, brigade or even unit basis, though more usually as divisional organizations supervised by D.A.D.O.S.

Of these the most important and universal was the armourer's shop. When a battalion was in the line there was very little its armourer could do, and he was apt to be employed on any odd job ; one, who was a champion grenade thrower, was employed as instructor, while another was recommended for mention in despatches on account of his pluck in carrying forward rations to exposed trenches. But by concentrating all the armourers, or it might be all except one per brigade, in a central shop, very valuable work could be done. A good supply of tools would be collected, and components accumulated automatically from the rifles of casualties. From these a pool of serviceable weapons would be formed and the division would become practically self-supporting. It was only a very light class of work that the individual armourer could carry out when working in his regimental lines, but in a central shop repairs of a heavier sort could be made. All the Lewis and Vickers guns, and the whole of the bicycles of the formation would be periodically overhauled, broken rivets in steel helmets renewed, and other equipment mended, manufacturing work being even sometimes attempted on a small scale.

Other shops were staffed by allowing men from regiments to work at their trades or by engaging French labour. A very useful institution often to be found was the bootmaker's shop. If there was anywhere where a stitch in time saved nine it was here. A boot which had adjusted itself to the foot was so much more comfortable than a new one that, by the time it was discarded, it was often too far gone to be profitably repaired ; and there was a prejudice against getting "dead men's shoes" from the base. At the divisional boot-shop the soldier would get his own boots back after resoling or heeling, and a substantial saving of railway transport between the front and rear resulted. In one division, D.A.D.O.S. dealt with 630 pairs a week, and where the boot was too

bad to mend it was given a wooden sole and used as a clog in muddy lines. Some also had tailor's, saddler's, carpenter's, blacksmith's and farrier's shops, where new horse-shoes would be forged out of old or from iron procurable locally. One division employed three tailors in sewing together the best pieces of worn-out puttees to make new, while another manufactured all its own nose-bags. Not only did those commanders, with their staff and Ordnance officers, who interested themselves in such matters reduce substantially the consumption of materials at a time when there was a such a dearth, they helped to lessen the immense burden of debt with which the country has been since saddled.

The first occasion when any special steps were taken to collect stray goods abandoned by the troops was at the end of September 1914 when a party, including two A.O.C. sergeants, was sent to scour the ground covered in our retreat to the Marne and collect anything to be found; this resulted in the recovery of a substantial quantity of goods, including 500 great-coats and other equipment discovered in a church at Coulommiers.¹ But the credit for setting up regularly organized salvage operations belongs to the 4th Division which, during the second battle of Ypres in May 1915, used to send up at daybreak every morning a party under its D.A.D.O.S. or some other officer from its headquarter staff to collect anything on which it could lay hands. Infantry passing back to rest were also instructed to dump in Ypres what they might find, which was brought back by the salvage party, D.A.D.O.S. making use of anything he required and sending the rest back to railhead. Among other items, 10,000 rifles were collected in five weeks.

The good work was continued by others and extended elsewhere, especially in areas that had been covered by operations. Statistical records would be published of

¹ The German Emperor in his book gives as one reason why England and not Germany was responsible for the war, that we had for years past stored reserves of clothing in the north of France! This illusion is based solely on the great-coats and other articles abandoned during the retreat and found by the Germans.

what had been collected by different units ; and rivalry became so keen that one Australian division, in its efforts to beat the New Zealanders, stole a lot of copper pans and pots from a derelict brewery to acquire merit. Nevertheless the progress of the war led to the presence of large zones of territory, the scene of successive engagements, in which the amount of derelict material lying about was very great.

It was to cope with this that a Salvage Section was attached to each main formation, aided by men from the Employment Companies formed of those unfit for the trenches. The method of conducting operations varied, and though the Ordnance was not actually responsible for the work, the great bulk of what was retrieved comprised Ordnance stores, so that success was impaired unless the Salvage officer worked in close harmony with the Ordnance officer.

In normal times a divisional organization was adopted, and here the harvest was in inverse ratio to the efficiency of unit administration. If much was found lying about the obvious reason was that equipment was not properly cared for. In those formations that had well-planned schemes the salvage dump was close by that of the D.A.D.O.S. who collected therefrom what he might need, and who would see that anything else of value was properly treated, and rubbish destroyed before the residue went to the base.

During periods of heavy fighting a Corps organization answered better, for then one division after another would enter and leave the battle. At such times the divisional salvage staff would be merged and everything brought into a Corps dump, in which the A.D.O.S. would be equally interested. When the fight was over whole battalions might have to be told off to collect the litter with which the scene of battle would be strewn.

The third form of salvage scheme was that adopted on the southern portion of our front, where successive tides of advance and retreat left immense masses of materials stranded. Here the organization was by areas, the whole in charge of the Army Salvage Officer. But

whether the organization was one of the Army, Corps or Division, the measure of its success, apart from the manual work of collection, depended upon the extent to which operations were supervised by the D.D.O.S., A.D.O.S., or D.A.D.O.S., as the case might be.

Readers of the earlier part of this book may recollect that the War Office had reluctantly agreed to the presence of a small Ordnance staff at the front, when the keeping of regimental equipment and clothing accounts was abolished on service after the South African campaign, solely because in no other way could the interests of economy be safeguarded; and it is indisputable that on these grounds alone the innovation was amply justified in the Great War, when the resources of the Empire were so strained.

But, when all is said and done, economy was only a secondary aspect of the work of a branch whose business it was to supply the troops with almost all they needed besides food. And, over and beyond the daily routine of furnishing their wants, the shifting kaleidoscope of the war continually revealed some fresh pattern. There was always some new problem to be solved.

Every autumn there would be the whole of the winter clothing and blankets to be got up and distributed, an enormous bulk which might entail arrangements for special trains to special centres. Six months later this would all have to be collected and returned, and other items worn in summer obtained instead. Fresh groupings and reorganizations which affected scales of equipment were constant occurrences, and to keep the list of each unit's equipment up to date was in itself an arduous labour. One day there would be a new camp to be formed in a rest area or a new bombing school to be furnished, a laundry to be stocked, its consumption of clothing to be checked or a complaint as to the soap provided for its use investigated; another day special arrangements perhaps to supply dry socks in waterproof bags to a bad section of trenches or to mend and dry trench gum-boots.

Hardly a week would pass without some novel article

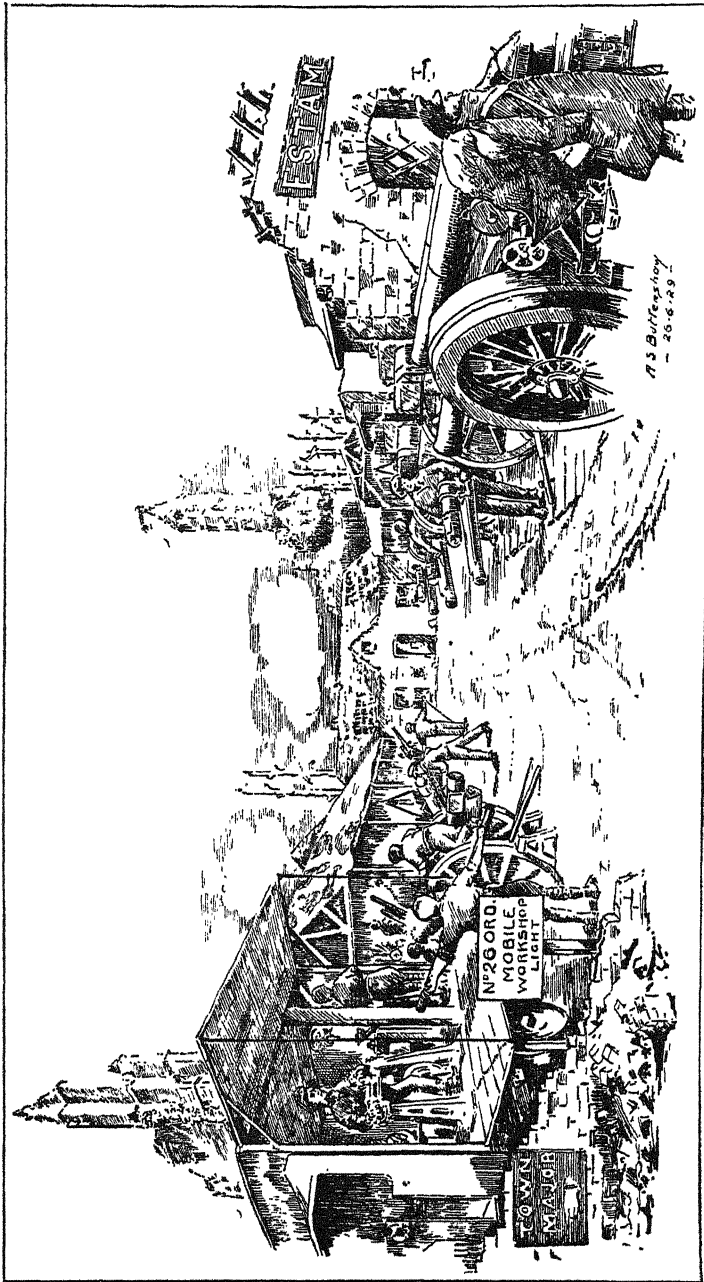
being wanted for a trench raid or some other special purpose ; and hardly a week without some invention having to be tested or an application for extra equipment investigated. In such cases there was rarely any precedent. Each had to be examined on its merits ; and though many were unconsidered fads, the grain had to be scrupulously sifted from the chaff, and great tact displayed when turning down even the wildest suggestion, to avoid a feeling of grievance.

When operations on a grand scale were in contemplation the Ordnance was kept busy for a month or more beforehand. Plans would be drawn up for collecting trench and area stores to be left behind in case of a substantial success, when these would have to be taken over by the lines of communication. There would be heavy calls for many special battle stores to be used during the fighting, and for pack transport wanted during an advance over an area strewn with shell craters ; and with whatever care plans were framed there was invariably something extra found wanting at the eleventh hour. Next, during the progress of the operation, there would be insistent and incessant demands to replace battle casualties ; and lastly the refitment of every unit that had passed through the furnace, with the collection of captured guns to be earmarked as trophies and the equipment of cages for prisoners of war.

Altogether the work was of great variety and interest, especially when it is borne in mind that certain major services which absorbed a large proportion of the energies of the Corps remain to be described—those, to wit, connected with the maintenance in action of the guns of which such enormous use was made in this form of siege war.

Ammunition supply will be dealt with as a whole in a subsequent chapter ; while in the following pages the methods of repair and replacement of artillery equipments will be described.

So fully did the mobile gun workshops sent to France in 1914 justify their existence that in May 1915 the scale was increased to two per Corps. The establishment was



A Typical Mobile Workshop

one Ordnance Mechanical Engineering Officer and 21 other ranks, the whole equipment being carried on two lorries ; one fitted up as a workshop with machine tools, and the other as a store for materials ; though a third lorry was later added and the equipment of machinery increased.

But these light workshops, conspicuously successful though they were, could not retain their quality of mobility if they were to carry the machinery required for much of the heavy class of work entailed in the repair of the large calibre siege howitzers that were beginning to arrive ; and, in March 1915, sanction was given for the creation of Heavy Ordnance Mobile Workshops on the scale of one per Army. Unlike the light shops which, though Corps organizations, were allotted according to gun strength and were therefore frequently on the move, the heavy stayed with the Army, acting as a feeder by making fittings or half-wrought stores, and undertaking jobs beyond the capacity of the light shop. It had a very full complement of machine tools from a steam hammer downwards and its establishment, two engineering officers and 89 other ranks, embraced every variety of trade. Here also was stationed the Assistant Inspector of Armourers, a grade created during the war, who supervised small-arm work and carried out experiments connected with machine gun equipments.

Armies were very quick to appreciate the advantage of an organization capable of providing any special store of a non-service character and the heavy shop was called on to undertake a great amount of manufacturing and experimental work, developing into a very large and unwieldy establishment—so that to call it mobile was really a misnomer. More and more machine tools would be asked for, artisans in the ranks of the army would be employed besides a large body of civilians, and from a hundred to two hundred hands would be constantly at work. During stationary warfare with masses of heavy siege howitzers the establishment was undoubtedly very useful, but in any other conditions it could not have

existed except further to the rear on the lines of communication.

In 1916, heavy artillery arrived in far greater numbers and a third type, the Medium Ordnance Mobile Workshop, was added on a scale of one per Corps, but distributed according to gun strength. This, like the light shop, was intended to be really mobile, its more substantial equipment requiring five lorries; though both tended to take root, especially when on a fairly quiet part of the front. Whenever possible a site would be found in some manufacturing works or a garage having useful machinery would be hired, and more materials accumulated than could be carried on the lorries; though here, unlike the heavy shop, expansion was in some degree checked by moves due to changes in the tactical situation.

The allotment was approximately one light shop per 100 guns and one medium per 90. The population of these institutions fluctuated with the number of extra hands, the following being a rough approximation of the eventual numbers, civil plus military.

Heavy	5 shops	900 employees
Medium	20 „	800 „
Light	40 „	1300 „
<i>Total</i>		<u>3000¹</u>

Co-ordination in methods and procedure was ensured by Section Inspectors who supervised the work over a large area, and, with the assistance of the workshop officers, carried out inspections at gun positions and took measurements of bores; the final technical responsibility for the work in the Army resting with the Chief Ordnance Mechanical Engineer who formed part of the staff of its D.D.O.S.

The last new establishment formed to deal with artillery materiel was the Ordnance Gun Park, first sanctioned in March 1917. By that time spare guns and components

¹ In addition, when Tanks arrived, a special gun workshop was established at Tank Corps Headquarters, with branches at the front, a total personnel of 160 being employed.

were more plentiful, so that it was no longer essential to hold the entire reserve in one central pool at the base, available to reinforce any part of the line. To reduce to the utmost the time taken in replacing casualties, each Army in turn was given a gun park to hold a stock of the guns and carriages in most common use together with their adjuncts, trench mortars and machine guns. These institutions were regular Ordnance depots in charge of an officer, with a fixed stock and keeping ledger accounts; and they were usually situated alongside the heavy workshop. The two were of mutual assistance, the park by providing materials for the shop, and the shop by making some fitting urgently wanted by the park. By this means also they could make use of a combined lorry service to those they served.

The machine guns, mortars and appurtenances were at the disposal of the Army but the guns and carriages was controlled by G.H.Q. Casualties were wired to the Q.M.G. who, in deciding what action should be taken, had to take into account the whole gun situation in France, both at the front and on the lines of communication. The machinery was very elaborate and furnishes a striking example of the duplication of work due to the office of the D.O.S. not being incorporated in that of the Q.M.G. Both had to keep the same records, every return of stock, either at the park or the base, had to be prepared twice over and every report of a casualty or instruction for its replacement concerned both. As an almost inevitable consequence misunderstanding and the issue of conflicting orders from the two offices occurred in times of stress, when reports of casualties followed close on each other's heels.

The Park, like the Workshop, tended to expand. By degrees its stock of guns was increased, wagons, limbers and platforms were added; and it proved a convenient centre for storing reserves of all kinds of battle stores. The number of items stocked grew to some 3000, with maybe 1000 transactions in 24 hours in busy times.

It would be difficult to overrate the value of these

establishments during intense and prolonged fighting when gun casualties were so severe. Prior to an attack it was possible to reduce the guns out of action to as low a figure as 1 per cent, and by dint of exertions the number undergoing repair might be kept down to 3 per cent during its progress ; but where time was chiefly lost was in journeys between the shop or park and gun positions, which would raise this figure as high as 15 per cent out of action. To reduce this loss in efficiency, an advanced gun park would be thrown out at such times, and light shops would be pushed up with detachments working in cellars or dugouts even further forward ; so that guns might be visited in their positions and minor adjustments or replacements effected on the spot. During the progress of a battle, work would never cease day or night, and be carried on in very harassing conditions, exposed to shell fire. Altogether it would be difficult to conceive of conditions less favourable to the nicety and deliberation usually associated with mechanical engineering operations. Many acts of bravery on the part of the workshop staff and armament artificers attached to artillery brigades were recorded.¹

Apart from damage by shell fire, the greatest cause of trouble was the buffer, especially that of our field gun. Neglect to keep it full of oil, combined with leakage through glands and packings, would result in excessive recoils, imposing an undue strain on the whole equipment and in particular on the recuperator system.

¹ These obviously cannot be quoted in full, but two of which I find mention in the D.O.S.'s diary on the same day will serve as examples, the Distinguished Conduct Medal being awarded in each case.

Armament Staff Sergeant Drew. Under an intense and concentrated hostile bombardment of our battery positions, he went on his own initiative round all the batteries to see if his services were required for repairs. The shelling was so intense that all the personnel had been withdrawn, and the coolness and disregard of danger which he displayed were beyond all praise.

Armament Staff Sergeant Primrose. For conspicuous gallantry and devotion to duty in sticking to his work on one of the guns under a heavy gas-shell bombardment, until blown from the gun by a shell. Although severely shaken he resumed his job and did not leave it till the gun was in action again.

Buffers would become bulged, piston rods elongated and running out springs would acquire a permanent set and lose their temper.¹ At one period of heavy fighting in the 4th Army the consumption of springs rose to 200 inner and 200 outer a day, and it was fortunate that a firm in the north of France was discovered capable of retempering them.

The following figures, which refer to the work of sixteen light and five medium shops during six weeks fighting in 1917, show how impossible the situation would have been without well-equipped workshops close to the front.

	Guns and carriages overhauled and re-issued.	Average rounds fired per piece during the period.
18-pr. gun	999	4720
4.5 how.	177	3096
60-pr. gun	140	3073
6-inch—30 cwt. how.	3	3560
6-inch—26 cwt. how.	260	4021
6-inch gun	2	2502
8-inch how.	58	2666
9.2-inch how.	31	2134

Besides which 450 guns and 390 carriages were condemned as unserviceable or for repair at the base, being replaced with few exceptions from the gun park.

It must be added that the efforts of these workshops were well recognized. Few periods of active hostilities but earned them special mention from Army or Corps Commanders and their artillery generals. No branch of the Corps had then to work at such high pressure, and the duties on which they were engaged were bound to strike

¹ The normal capacity of the 18-pounder buffer was 4.5 pints, and of eight carriages overhauled, where the contents were measured, the amount of oil present was as follows :

3.5 pints	2.5 pints
2 "	2.75 "
3.25 "	almost full.
1.75 "	almost empty

To fire a gun very rapidly with insufficient oil in its buffer is something like driving a car at racing speed when its crank-case is short of oil.

the eye of a commander whose force included such a mass of guns.¹

* * * * *

It was not to be expected that other lines of Ordnance work should figure so conspicuously in the search-light of battle. In fact the functions of the Ordnance can in a sense be compared to those of any public utility service—say the telephone. The average Londoner is so used, in his home or business life, to having a telephone at his beck and call that he cannot appreciate its value. He may, perhaps, during the course of his life pay a visit to a large exchange, and be vaguely interested in the complex electrical machinery that enables his calls to be so promptly answered and registered, and which he will view with awe though he cannot comprehend. But should anything go wrong, incorrect numbers be called up or a bill disputed, he anathematizes the service and writes to *The Times*; and it is only one day, when he wakes up to find his line out of order, that he realizes what a boon his instrument has been and how lost he is without it. The telephone in fact is only discussed when it fails to function satisfactorily.

¹ A few examples are appended.

D.D.O.S. 1st Army.

The Army Commander wishes me to convey his thanks to all ranks of the A.O.C. in the 1st Army for the excellent work which they have done and for the great assistance which they have given to the artillery, prior to the present operations.

For an offensive under present conditions, the keeping of guns in action at rapid rates of fire for prolonged periods is absolutely essential, and puts equipments to a severe test. It is a great tribute to the excellence of the work done in overhauling guns which have arrived in this Army, in most cases in a bad condition, that the Canadian Corps artillery had a higher percentage of guns in action on the night of the 9th, after the attack, than they had at any time during the previous weeks.

D.D.O.S. 5th Army.

The Army Commander wishes you to convey to the officers, N.C.O.'s and men of the Ordnance Workshops under your command his appreciation of the excellent work done by them during the last few weeks.

Owing to the intensity of our bombardment there has been a continual flow of guns of all calibres into the shops for overhaul and repair, but the

It was much the same with the Ordnance. Regiments received equipment and clothing so regularly that they could not appreciate what an amount of work was involved in its supply. That they should get what they needed was treated as a matter of course, they troubled not about how or whence.

This point is well put in the following quotation from the History of the 9th (Scottish) Division, the first new army division to go to France. "The Unit that had perhaps most reason to complain that the worth of its labours was never fully appreciated by the Infantry was the Ordnance Department which, consisting of an officer and 13 men, had to satisfy the needs of 16,000 men, 3750 horses and mules, and numerous vehicles and bicycles, in everything except food, light and fuel. The excellence of the work performed by this branch was largely the explanation why it was so much taken for granted; if it had proved less competent in furnishing and repairing munitions, it would have been better, though less favourably known to the infantry. The Ordnance people averred that they toiled harder than any other Section in the Division; when units were in the line they were busy meeting their fighting needs, and when they were out they were busier still re-equipping them."

To the staff officer also the methods of the Ordnance men have in every case been equal to the work, and the rapidity with which these guns have again been put into action is most creditable to all concerned.

The Army Commander further wishes you to inform these officers, N.C.O.'s and men that by their untiring energy and work they have contributed in no small measure to the success of the recent operations.

The Army Commander intends to go round the Shops shortly.

A.D.O.S. IIIrd Corps.

I am directed by the Lieut. General Commanding IIIrd Corps to inform you that he considers the work which has been carried out in the Corps Workshops since June 1916 reflects great credit on all ranks, and shows that it has been carried out with zeal and energy. The extensive repairs carried out show the important part taken by the Workshops in the modern battle and the Corps Commander hopes shortly to be able to visit the Workshops and see those at work who have so materially helped towards the efficiency of the troops in the forward area.

were a sealed book at the outbreak of war ; he was apt to expect it to perform miracles and produce at a moment's notice anything that might be wanted like a conjurer from his hat, and to become impatient when difficulties were explained to him. But he could not fail to learn about a branch that played such an important part in army administration and became much more understanding and helpful as time went on.

Sometimes parties of officers and others would be taken to visit great Ordnance emporia, when they would be astounded at the magnitude of operations, interested in seeing the wheels go round, and return very impressed ; but it is the bare truth that the ordinary officer failed to realize all the Ordnance did for him and his men for the simple reason that its work proceeded smoothly and silently to the outside world.

CHAPTER V

THE LINES OF COMMUNICATION

THE subject of duplicating the lines of communication to cope with the rapidly increasing strength of our forces was broached in December 1914, and the idea soon after took shape for reinforcements, a portion of whom were sent out via Boulogne in place of Havre. In February 1915 a Territorial division was concentrated on arrival at Etaples some miles to the south of Boulogne, an Ordnance staff being sent there to arrange for its encampment; and it was then decided to form large reinforcement camps and hospitals at Etaples with a permanent Ordnance depot to cater for this floating population.

Meanwhile sites were being explored for a base depot on the northern line to correspond with Havre on the southern, Calais being eventually selected; and Colonel Scott was sent out as D.D.O.S. Southern L. of C. to relieve Heron who became D.D.O.S. Northern L. of C. and was detailed to organize the new base. And excellent arrangements Heron made, acquiring, among other premises, a large timber-yard belonging to the firm of Valdelièvre with all its contents. The timber was most useful and owing to rising prices the bargain resulted in a profit of some £10,000. It was possible to inaugurate the new depot with deliberation. Demands, based on the average monthly consumption of one division and one cavalry division, were sent home in March, and a staff was formed partly from those with experience of the work at Havre. Thus when, in June 1915, Calais started to function, everything was already well organized and a good stock collected. At first Calais was not regarded as too secure, but fears on this account were soon dissipated and the work of supplying the troops at the front was distributed as evenly as possible between the two base depots, which provided as well for all other establishments in their respective zones.

There was however one class of goods of which Calais

was originally deficient. The stock of heavy artillery was so meagre that it was impossible to divide it, and no guns or artillery components were at first held. As the position improved this was gradually rectified, but now another difficulty came to light. The distribution of artillery, which depended on the tactical situation, was very variable. At one time there would be an enormous concentration in one part of the front, then would follow movements elsewhere, and these moves were usually sudden and secret. This applied even to divisional artillery, though far more to heavier natures; and resulted in constant transfers of indents and other documents backwards and forwards between Havre and Calais, the difficulty being accentuated by the fact that the stock of spare parts was never superabundant. Calais was the more centrally situated of the two, nearer to the front and to our own shore, and it was therefore decided to concentrate the whole of the artillery stores there, the transfer of the Havre stock taking place in June 1917. Armies by then had gun parks to which issues were made in bulk, and thus the process of sending small parcels of gun-fittings from Calais to a formation based on Havre by a complicated cross-country railway journey was avoided.

With the continuous increase in the volume of work, other depots were formed to relieve congestion at Havre and Calais. Blargies Sud on the southern line and Les Attaques just outside Calais on the northern, held the stock of sandbags, barbed wire, picks, shovels, etc., that were issued in bulk to Advanced R.E. Parks. Further relief was afforded by the acquisition of premises at Paris for the storage of winter clothing and blankets; and when, in the summer of 1916, an ammunition depot at Rouen was evacuated, the clothing group at Havre was transferred to the empty site.

The depot at Abbeville expanded considerably. Calais was so near the front that in case of urgency small consignments of stores could be sent up by lorry; but Havre was much further distant, and Abbeville was a

THE LINES OF COMMUNICATION 91

convenient centre for keeping a small reserve of guns and machine guns for the Southern front, which proved very useful during the battle of the Somme and on other occasions. Abbeville also afforded relief to Havre by repairing wagons on its behalf, mainly for the advanced horse transport depot located there, and by making tables and forms by the tens of thousands.

While at St. Omer, G.H.Q. became surrounded by a very large colony including a training school for officers, to cater for whom an officers' shop and small depot were provided. When G.H.Q. moved to Montreuil it shed these incumbrances, and the depot came within the area of the Northern L. of C. It was there that the D.D.O.S. L. of C. North had his office, while that of D.D.O.S. South was at Abbeville.

There were, besides, a number of depots at places on the coast where various institutions existed—at Boulogne and Dieppe (to be accurate at the ammunition depot of Rouxmesnil, a few miles inland) which were ammunition ports, at Le Treport and eventually at Trouville. Marseilles remained in existence to serve troops going to and from the east, and when Portuguese troops arrived, for whose equipment we assumed entire responsibility, a small depot was installed at Brest where they landed. There was also a depot at Cherbourg, the port for what was known as the Mediterranean line of communications, which stretched by rail through France to the foot of Italy and was used for forwarding supplies to the East. This line will be more appropriately described elsewhere, but it deserves this brief mention because France was largely concerned in its organization and often had to despatch stores along this route from its base depots.

The last Ordnance establishments, apart from ammunition, that remain to be mentioned were those at supply railheads. How it first came about that the base depot had its representatives stationed there has already been mentioned, and in the summer of 1916 Ordnance officers were appointed at the rate of one per Corps to its main railhead with subordinates at its subsidiary railheads. They checked and handed over to the Ordnance officer

of the formation what arrived ; but their chief duty was to deal with goods returned from the front. If serviceable these might be kept for re-issue ; otherwise they were returned to the base after fragile goods had been carefully packed and rubbish destroyed. A further refinement on the Southern line, where the regulating stations for traffic at Abbeville and Romescamp were well in advance of the base, was the stationing at these points of a representative to intercept and reconsign goods for units which had miscarried owing to a change of address ; and to repack in bulk small lots of returned goods to set free partly loaded railway trucks.

Within his respective area, which stretched from the coast up to railheads, the D.D.O.S. L. of C. supervised all Ordnance establishments, whether connected with stores or ammunition. His duties were mainly those of co-ordination and inspection, the allocation of buildings and personnel, and the consideration of plans for new installations. Apart from matters of general policy, the two main depots got their instructions from the D.O.S. These were the chief centres of Ordnance activity, where all the executive work of providing for the fighting troops was carried on and the vast majority of the Corps laboured ; and, as everything hinged on their functioning correctly, their interior economy needs a detailed description.

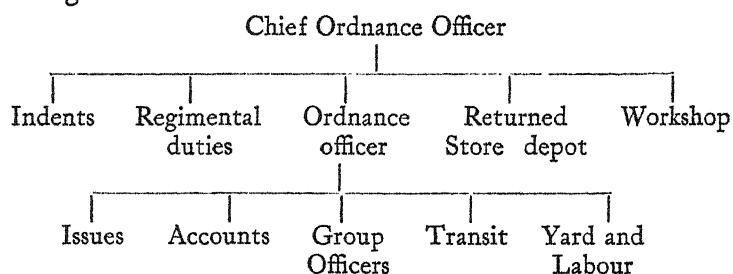
Starting at the foundation, at both Havre and Calais there were Provision offices under an A.D.O.S., which were in a sense detached portion of that of the D.O.S. They got their orders direct from him, being told what stocks or reserves were to be held, and they kept him in touch with the supply situation. Day in and day out the Provision officer was engaged in reviewing the depot stock, so as to cover the whole ground weekly and ensure prompt replenishment from England. One source of difficulty was the frequent shifting of divisions and units from one part of the battle front to another ; increasing the liabilities of one of the two base depots at the expense of the other. For instance, on one occasion the A.D.O.S. Provision, when examining the weekly review

THE LINES OF COMMUNICATION 93

sheet of clothing, was perturbed to find a serious shortage of boots, jackets and trousers of small size. The explanation proved to be that the battalion of Bantams, composed of sturdy undersized men, had been transferred from one army to another.

The purchase of stores in France, usually bought through our Paris agency, was also in the hands of this branch. However these purchases dwindled as time went on, for France needed all its own resources. The peak was reached in June 1915 with a figure of £140,000.

Apart from this, all work at the Base was in charge of the Chief Ordnance Officer, the sub-division of duties being as under :



Taking first the Indents branch. Despite the fact that whenever possible articles were demanded in bulk, the number of indents was prodigious, from one to two thousand reaching each base daily. Yet skilful organization enabled all to be dealt with on the day they were received. The first step when a batch arrived would be to pick out guns or other specially important and urgent items and pass out at once an order for the depot to make issue. Then came the detailed examination. This branch kept the order of battle showing the situation of every unit at the front and circulated information as to every change to all concerned.¹ The incoming indent would be scrutinized in case any change of address had

¹ Movements were notified by telegram from the formation Ordnance officer in the following stereotyped form : Move (code word of unit) to (code word of new formation).

occurred since it was prepared and to see that what was demanded was authorized. Then finally the document, often a telegraph form or maybe a slip of paper with a rough list of articles and quantities, was dissected and the portion appertaining to each group of storehouses transcribed on a separate issue order form.

The stock was divided into groups of so many store sections, each group a self-contained depot in charge of an officer. The group officer sent his review sheets direct to the Provision office, received his indents direct from the Indents office, and was responsible for his stock—in fact for the whole interior economy of his group. The ideal arrangement was to have a receipt bay at one end of the group and an issue bay at the other, so as to have a constant flow always in the same direction. The issue bay was divided by partitions, a separate pen for each formation, and one for local units. No sooner was a batch of issue orders received than “layers out” would set to work to get from the stock the items demanded; and next “packers,” who also labelled and addressed the packages. Every half hour the batch of orders thus dealt with would be passed to the group office for the preparation of vouchers. Finally the issue order was scrutinized and the A.D.O.S. Provision informed of any item that could not be met.

Under this system the Ordnance officer charged with the general supervision of the depot was relieved of this daily routine, his share of the work being mainly in connection with services common to all groups, such as personnel, organization, accountancy and accommodation.

Loading and despatch were dealt with by the Issue branch of his office, which received a daily return from each group showing what truckage it required. After consolidating these returns, the officer in charge of Issues arranged with the R.T.O. for trucks (a very variable quantity that might be as high as 200, though averaging about 60) to be placed at the most convenient centres for loading. “Checkers” were stationed in the trucks allotted to each formation with a list of its units, the

names being inscribed on removable slips in a wooden frame; thus, if any change in the order of battle occurred, even while the truck was being loaded, the slip could be removed and the stores transferred to the appropriate truck. The group then brought its goods and distributed them among the formation trucks, where they were tallied in by the checker to see that the packages agreed with what was shown on the vouchers and that they were being sent to the proper railhead. The preparation of the way-bill proceeded concurrently; and loading was no sooner finished than this, with copies of the vouchers, was placed in the truck, which was then sealed.

The system of store accounting differed from that which prevails in peace. At first the usual plan was adopted—a central ledger office with tallies kept by each storeholder. Transactions however were on such a vast scale and conducted at such a pace that the posting of ledgers ran in arrears; and they were useless either as a check on the tally or a record of the stock.

The tallies were therefore converted into ledgers held in the group office, where they could be more promptly posted, and the central ledger office was abolished; a plan found to answer excellently—every transaction being entered up on the day it occurred.

To guard against errors, now that there were no tallies on which entries would be duplicated and no double entry bookkeeping as in peace (when every transaction is booked up in the recipient's equipment ledger as well), the accounts branch carried out an internal audit. Its clerks checked every entry during the silent hours, to set free the ledgers for posting during the day; and a night audit staff, in addition, examined 10 per cent of the transactions, seeing that the supporting documents—vouchers, way-bills, etc.—were in order and paying special attention to matters such as issues on payment. What with our Dominions, Allies and prisoners of war there were many of these to be recorded in special ledgers, it being necessary in some cases to distinguish between initial issues and maintenance covered by a capitation grant.

It can be said with assurance that accounting was throughout extraordinarily accurate, having in mind active service conditions on this gigantic scale, and any important loss was always capable of satisfactory explanation. With the concurrence of the Financial Adviser large powers to write-off losses were delegated, and it was most exceptional to find any difference of opinion between Ordnance and financial officers. The latter at all times took a broad view and were most helpful.

While on the subject of store accounts, two other details deserve mention. Their complete abolition on service, except at Ordnance depots, was not really justified. To relieve troops fighting at the front of this burden was right enough, but the measure was a mistake for institutions on the lines of communication, such as reinforcement camps and hospitals. Not only did it encourage waste, but the Quartermaster could not do his work properly, however excellent his intentions, without a knowledge of what he was responsible for. Accounts in a simple form were therefore re-introduced for permanently situated units. Another safeguard was that adopted to prevent men from improperly disposing of their necessities. There was a ready sale for articles such as socks and clasp-knives at a port like Havre, and the soldier's kit was often not complete when he left England, so that it was easy for him to explain away a deficiency. To guard against this irregular traffic a sheet was inserted in the soldier's service and pay book detailing what he brought to France.

The Transit branch re-consigned goods that never entered any group, those for some other depot, for our allies or another front such as Italy; and salvaged materials or captured guns on their way to England. It also dealt with shipping, a subject to which a few words must be devoted, since it is one that cannot fail to concern the Ordnance officer very intimately, even if indirectly.

The difficulties caused by the manner in which the war reserves were shipped to France in August 1914, and the steps taken to overcome them, have been referred to in the first chapter; and after this matters worked

for awhile very soothly. From the time of their delivery at a depot in England until issued to the troops, the Corps never lost sight of its goods. They were loaded on rail under its supervision at home, shipped by an Ordnance officer at a port specially allotted for store-ships and taken over by the transit staff at the base depot overseas ; and the process in the reverse direction was similar, the same storeships being used. The responsibility for quantity and condition remained throughout with the Ordnance.

But, at the close of 1916, it was decided to place all shipping work in France under a Transportation Directorate, so that ports might be used to greater advantage and vessels turned round for a fresh voyage with the utmost speed. We alone were landing stores at the average rate of 1000 tons a day each at Havre and Calais ; besides which there were engineer materials, foodstuffs and ammunition to be discharged. In January 1917 the loading and unloading of vessels was taken over by the Director of Docks, one branch of the new directorate, and the Corps was called on to give up a good portion of its accommodation in the docks to form transit spaces, the Director of Docks undertaking to hand over the stores, either in these spaces or at the storehouse, should it be outside the area of the docks. At Calais the construction of a new inland depot at Vendroux was taken in hand ; though fortunately, before it was ready, consignments for that port began to arrive by a channel train ferry, so that trucks could be delivered direct to their destination. Meanwhile there was much congestion and delay at both bases in laying hands on goods that might be very urgently wanted.

The result of a system which co-ordinated all shipping in France under one head may have been necessary, but from a departmental point of view it was not a blessing. It pushed out depots from the quayside and thus involved additional handling, the transit spaces during periods of pressure became blocked, and stores urgently required were buried under those received later and perhaps of less importance. This was largely due to causes beyond

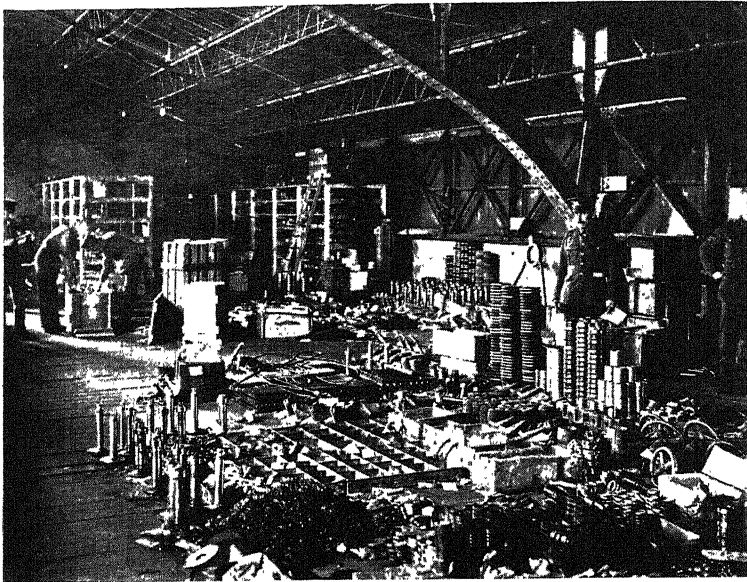
the control of the docks directorate, such as a shortage of trucks or labour. Another weak point was that the directorate acted only as stevedores, and not as shipping agents ; it simply took over the goods from the shipping company (the navy) at the port of arrival and handed them over to the consignee. It took no responsibility for condition or quantity, the C.O.O. continuing to act as consignee and signing the ship's manifest. The importance of keeping a careful check was considered to be far less than that of effecting a rapid discharge ; and the former had, therefore, to go by the board, the result being the frequent writing-off of considerable losses in transit.

The arrangement, which incidentally proved unworkable for ammunition, was a war-time improvisation. If it was essential to discard the method employed up to the end of 1916, the transportation directorate ought properly to have combined dock and stevedoring work with that of a shipping agency ; and had its representatives on either side of the channel to take over goods at home and deliver them to the consignee overseas, accepting responsibility throughout. But from a purely departmental point of view the arrangement previously in force unquestionably worked better.

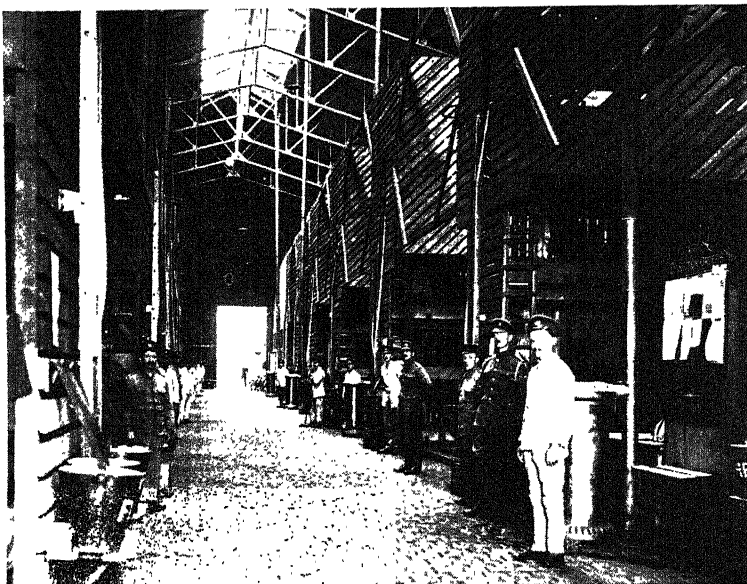
However, considering the many real difficulties that had to be contended with, the work was carried out with remarkably little friction owing to the helpful and business-like spirit in which the problem was taken up by the docks and railway directorates, and to the way in which the C.O.O.s of our main base depots adapted themselves to fresh and often trying conditions.

About the last branch of the Ordnance office, that under the Yard and Labour officer, there is little to be said. This branch was responsible for the general cleanliness and tidiness of the depot, distributed labour among the groups from the general pool, and furnished such road transport as they needed.¹

¹ A few random figures will help to illustrate the scope of work of a base depot. They relate to what was issued from Calais during the first



LAYING OUT GUN-COMPONENTS FOR ISSUE



THE LINES OF COMMUNICATION 99

Turning next to the other establishments for which the C.O.O. was responsible.

Regimental work can be dismissed very briefly, being much the same in war as in peace; though a much appreciated feature not usually to be found in an Ordnance depot was the band to which the Corps marched to and from work and which helped to enliven hours of recreation by its concerts.

A detail worth recording is that Sir John Lavery, when painting a series of pictures illustrating the soldier's life in France, selected, as a model of what a cookhouse should be, that of the Corps at Boulogne, the picture being hung at the Royal Academy in 1919. At Havre a large hangar was fitted out with tiers of bunks for those working in the main depot. It accommodated 1000 men and its rent was £1000 a year—very cheap housing. Regimental work there was in charge of an attached officer, Lt. Col. Lindsay Scott, who died during the war, a most popular officer with all though a keen disciplinarian; and the Corps in his hands gained a well deserved tribute from the Base Com-

ten months of 1916, an intermediate period, and by no means one when figures were at their maximum.

- 11,000 Prismatic and magnetic compasses.
- 7,000 Watches.
- 40,000 Miles of electric cable.
- 40,000 Electric torches.
- 3,500,000 Yards of flanellette.
- 1,250,000 Yards of rot-proofed canvas.
- 26,000 Tents.
- 1,500,000 Waterproof sheets.
- 12,800 Bicycles.
- 20,000 Wheels.
- 5,000,000 Anti-gas helmets.
- 4,000,000 Pairs of horse and mule shoes.
- 447,000 Lewis gun magazines.
- 2,250,000 Bars of soap.

The officers' shop, which formed part of the depot, was as popular at the base as at the front, 12,900 visits to that at Havre being made by Officers during the above period to buy clothing and equipment. Eventually a cashier from the Paymaster's office was posted to each shop for the convenience of those dealing there.

mandant for their clean premises and smart turnout in the streets.

The Returned Store Depot must be dealt with at greater length. Judging by articles that appeared in the press from newspaper correspondents who visited Ordnance establishments in France, the point that impressed one and all was that nothing was wasted. The volume and variety of commodities dealt with, and the regularity with which they reached the troops, is barely commented on ; but that an old saddle should be refurbished or an old suit of clothes cleaned and mended was apparently regarded as an astounding feat. Yet this was merely a normal duty of the Corps, expanded like every other branch of its work. Long before " salvage " became such a shibboleth, the saving of every scrap of material not absolutely worthless was being undertaken ; and it was to deal with such matters that the depots at Gravelle (Havre) and Valdelièvre (Calais) was created ; institutions the like of which had never been seen before.

These places served as clearing houses ; what was serviceable was passed on to the group, what could easily be made fit for further use was mended, what needed skill to repair went to the workshop, what was to go home was handed over to the transit branch, what was no longer of use was broken up and the produce sold or sent home as old metal or other materials ; and the residue, a very small fraction, was burnt. It was out of the question to keep strict account of all this old material and only valuable and important stores such as guns were accounted for.

Another point commented on by the Press in connection with these establishments was the extent to which female labour was employed ; and it is an undeniable fact that in both these forms of economy, salvage and the saving of man-power, the Army Ordnance Corps set the example.¹ It was the first to employ French and Belgian

¹ The following are extracts from a couple of the newspaper articles in question.

The *Daily Mail* had an article headed ' Ordnance Women ' dated the 30th September, 1915 : " Progressively, day by day, women are being enrolled for war work of many sorts, and their capacity and readiness are

THE LINES OF COMMUNICATION 101

women, not only in ordinary women's work, like sewing and washing, but on jobs such as cleaning wagons and rifles or even on unloading barges of barbed wire, long before women replaced men in England or the Women's Auxiliary Army Corps appeared in France. Girls who knew not a word of English actually undertook simple office work such as filing documents.

An important feature was the rag industry, at first confined to a small scale as the medical authorities objected to old clothes being sent back from the front lest they should harbour disease germs. An outbreak of enteric in a training ship on the Thames had been traced to the sale of old blankets at the Cape after the South African War, and the idea of sending lousy and bespattered garments back in wagons and railway trucks that might next be used to carry food was repellent.

There were laundries and disinfectors near the front where the garments of men attending at bath-houses

on the way to be appreciated ; but it is not, I think, yet known how very useful their aid is proving in France and how many are being employed within the circle of War Office departments. The Army Ordnance were, as it seems to me, the first organizers to discover the value of women within the zone of the Armies ; and the Ordnance are now steadily extending their sphere. The discovery of the scope for women by our Ordnance is indeed probably the most distinct advance in economy yet achieved. No one can visit the great Ordnance centres in France without being struck by the lead given in this direction."

Mr. Danchenko, the famous Russian war correspondent writes in *The Times* of 15th June, 1916, under the heading : "Salvaging battlefield wreckage, British Military Thrift : Never, I think, has the practical genius of the English revealed itself so strongly as in this war. We were taken to see their activity at the rear of the Army. Here some thousands of French women whose fathers, husbands, and brothers have gone to the war earn a handsome living of which they could not dream in peace time.

"It is most marvellous to see the things that are done here. Take, for instance, boots. Our boots when they are worn out are thrown away by the soldiers. We saw heaps of these cast-offs near the Russian trenches in Galicia and Poland, and indeed of what use could be that leather torn in pieces and as hard as wood ? Here, however, things are different. We saw sheds full of these old boots, piles of rubbish, and I could not understand what they were going to do with it all ; but here we saw, stage by stage, this rubbish turned again into splendid boots, soft and strong."

THE WESTERN FRONT

were exchanged and washed ; and great-coats or other articles only needed in winter were stored and renovated on the lines of communication during the summer months. But all the ordinary clothing of the fighting troops, upper or under, was for long burnt as soon as the soldier with his house-wife was unable to mend some small rent.

The process was very wasteful ; for, even if unfit for repair, the garments had a market value ranging from £50 to £112 a ton as rags. The D.O.S. on several occasions pressed for the return of this old clothing from the front ; but it was not until the spring of 1916 when the War Office, after pointing out with satisfaction how well organized and valuable was the industry established in the rearward zone, urged its extension and definitely ruled that disinfection was not essential, that G.H.Q. gave way. Hereafter old garments were returned from the front in sacks, the trucks being afterwards disinfected ; and what was beyond repair sent home.¹

But this was only one of innumerable forms of salvage. The manufacture of sacks for packing was another important industry. Web equipment was scrubbed by means of a special plant with revolving brushes, leather work cleansed and dubbed, waterbottles washed out and recovered with felt, waterproof sheets patched, mess-tins re-tinned, house-wives refilled, camp kettles scoured and

¹ How valuable was this salvage operation can be gleaned from the following statistics :

May 1st, 1916, to May 10th, 1917.

Received in England
from Overseas.

Articles.	Issued Overseas.	Quantity.	Value as rags.	Percentage returned.
Jackets	2,912,530	1,323,435	1/6	45
Trousers	2,844,150	1,306,671	1/4½	45
Great-coats	482,317	221,483	3/8½	45
Pantaloon	1,556,685	375,539	1/5½	24
Shirts	5,934,158	1,445,356	6¾	24
Cardigans	1,478,128	524,644	1/6	35
Drawers	4,907,245	1,062,854	11¾	21
Socks, pairs	12,724,340	3,883,110	3	30
Putties, pairs	3,631,899	714,166	6¼	19

THE LINES OF COMMUNICATION 103

greased, cutlery polished, tentage dried and mended; tens of millions of articles being dealt with in the course of the war.

Great ingenuity was displayed in finding some use for even the most worthless materials. Laces were cut from the uppers of old boots and the residue of leather used as fuel, solder was recovered from old tins, lead from the linings of tea chests, nosebags and cooks' clothing were made from old tentage, worn-out ground sheets and waterproof capes reappeared as ration bags and cap covers, old oil drums became braziers, kerosine tins fire buckets, arm or leg baths for hospitals were made from petrol tins, and the spokes of old wheels turned into legs for tables and chairs. The blood of slaughtered bullocks was even commandeered from the A.S.C. butchery and used in place of linseed oil for making paint.¹ From this great mass of rubbish it would have been difficult to find even the squeak which is reputed to be all that is left of the pig after passing through a Chicago cannery.

Besides all this miscellaneous work Havre, and Calais also for a considerable time, had to deal with empty ammunition packages and cartridge cases which were sent home on storeships to avoid delaying vessels engaged in bringing munitions to France. The tonnage was gigantic, and a careful examination was necessary to ensure that serviceable rifle ammunition was held back and that explosives were not shipped among general cargo. This was another job carried out by French women.

Closely connected with this work were our establishments at Paris, originally the product of Heron's fertile brain, who was the first to realize the importance of organized salvage. During the winter of 1914/15 numbers of great-coats, blankets, horse-rugs, etc., found

¹ Some idea of the volume of work can be gathered from the fact that, in the first ten months of 1916, 136,000 tons of stores arrived at Calais from the front, including 1,300,000 pairs of boots and 280,000 rifles. In the same period, of 130,000 sets of accoutrements issued, all were salvaged stock except one quarter of the packs, haversacks, mess-tin covers, waistbelts and cartridge carriers; and of a million waterbottles supplied during the same period one-third came from the same source.

their way back to Havre, which, although in filthy condition, might, he thought, be made fit for further use after a drastic process of washing, disinfection and repair. The result of a trial order given to the Paris firm of Joly Fils was satisfactory, and in March a contract was entered into with this firm for washing and mending at fixed rates. The next step was to find premises in which to house the goods, the majority of which were not wanted during the summer ; and a large empty warehouse at the Quai de Javel, close to Joly's establishment, with its own railway siding, was leased. A staff of the Corps under Colonel Keddie was sent to Paris to take charge of the work, and henceforth winter clothing, blankets and horse-rugs were sent straight to Paris from the front to be renovated, stored and re-issued the following autumn.

There soon followed the installation by the London house of Debenham and Freebody of a special fur-cleaning plant to deal with sheepskin-lined coats, fur undercoats and leather jerkins. These required special treatment, being revolved in large drums with sawdust impregnated with cresyl and formaldehyde. Later on we took over this plant ourselves and largely increased the output by fitting powerful exhausts.

The Paris establishment expanded by leaps and bounds. The capacity of Joly's laundry was quickly swamped and work found for many others in and around Paris. Dry cleaning was substituted for washing in the case of service dress to save shrinkage, and what was too badly stained was dyed blue for the use of Chinese labour or prisoners of war. It was found cheaper to carry out repairs in our own workrooms rather than by contract ; and, employment in fashionable dressmakers' shops being scarce, there was no difficulty in getting *conturières* capable of even such a speciality as remaking kilts.¹

¹ Work on "jupes écossaises" was very popular for it was finer and the cloth softer than service dress. There was great speculation as to what was worn underneath, the true answer always leading to the reply "incroyable" !

A memorable occasion was when the Prince of Wales visited these workrooms where some 2000 women were employed. To be spoken to

THE LINES OF COMMUNICATION 105

Trench gum-boots opened up a new line in a large garage in the district of Pantin, under a specialist officer. Work of this nature was entirely novel ; the washing was simple enough and repairs to the rubber not difficult, but to dry the insides of the boots was by no means easy until an ingenious hot-air apparatus, designed by an Ordnance engineering officer, was installed and enabled 1500 pairs to be dried in a day

In all former wars, old clothes and boots, and usually old equipment, had been treated as rubbish fit only for the scrap-heap ; and it is no exaggeration to say that the salvage operations of Havre, Calais, Paris and to a lesser extent of other depots which all shared in the work, directly saved the nation a bill that can only be computed in terms of tens of millions sterling. Enormous though the sum must have been, however, the saving cannot be in their own language by a real Prince and to be allowed to crowd round while one of their number presented him with flowers and another, an ex-singer from the Opera Comique, sang the "Marseillaise" was a treat these French girls will never forget.

Among the principal articles dealt with during the progress of the war were the following :

Blankets	10,426,000
Cardigans	1,909,000
Pairs of Drawers	3,809,000
Great-coats	1,866,000
Jackets	1,250,000
Leather Jerkins	2,342,000
Fur Undercoats	1,028,000
Kilts	115,000
Gum boots	489,000
Groundsheets	142,000

The Paris Depot balance sheet by the end of the war read as follows

£		£	
To washing contractors	429,067	By estimated value	
Civil labour	180,282	of clothing, etc.,	} 8,122,526
Cost of military establishment and transport	88,435	recovered, on basis of half price	
Rent and repairs	26,424	Value of rags sent to England	
Miscellaneous expenses	68,800		865,100
Net saving	8,194,618		
	<u>£8,987,626</u>		<u>£8,987,626</u>

measured by pounds, shillings and pence alone. Without these salvage operations all the sheep farms of Australia and all the cotton fields of America could not have produced the raw materials we needed ; nor, even had shipping been available to carry them to England, could all the looms of Yorkshire and Lancashire have sufficed to weave cotton and woollen goods for our armies and civil population besides Allies whom we clad.

The C.O.O. Paris, whose office was situated in the Rue de Vivienne at the heart of the business district, also acted as our purchasing agent, and was in touch with the French War Office, without whose permission no substantial transaction was permissible. There were often, especially at first, sudden unexpected calls for articles that could be bought without involving the delay entailed in applying to England. It is to be feared, however, that this result, satisfactory though it might be, was not popular with D.A.D.O.S. who had been glad to snatch an occasional few days' respite and pay a visit to Paris to obtain some out of the way article for which the division displayed a sudden longing.

The Corps also enlisted at Paris two recruits of very unusual calibre. In the spring of 1915 Sir Bampfylde Fuller, K.C.S.I., late Lieutenant Governor of Bengal, happening to find himself there, tendered his services to the C.O.O., and was followed soon after by Sir William Morison, K.C.S.I., another distinguished Indian Civil Servant who had been Chief Commissioner of Scinde. Both were gazetted majors and remained to help, sinking their dignity and not finding it derogatory to occupy themselves, the one with petty purchases, and the other in overhauling old clothes.

These salvage establishments, however, only dealt with special lines of renovation. Where technical skill was wanted, articles went to the workshops, the last subdivision of duties supervised by the Chief Ordnance Officer, the doings of which remain to be recorded.

When, in the late autumn of 1914, the base was transferred from Nantes to Havre, the senior Ordnance

THE LINES OF COMMUNICATION 107

Mechanical Engineering Officer present was Major Davies, who had served in the South African campaign, where the extemporized shops were notoriously poor and inadequate. Profiting from his past experience, Davies saw that those now installed at Havre were amply provided for, with properly designed and large workrooms capable of expansion, the whole planned so that work could be carried out with a minimum of labour. That this step was taken from the outset was providential; had work been started on a cramped scale, the workshops would have been overwhelmed by the flood of orders that quickly began to pour in.

Calais was able to profit by the experience of Havre; by then the scope of the work was better realized and there also the shops inaugurated by Major Everett were designed on a proper basis; though even so extra premises had to be acquired from time to time at both places. These establishments, it may be mentioned, were chief among the sights that interested distinguished strangers in France and were visited by the King and Queen.

Apart from size their outstanding feature, compared with the workshops of a Command in peace, was the extent of their manufacturing operations, the reasons for which have been already indicated—the shortage in supply of gun components and the many alterations to design initiated in France, which moreover were not confined to artillery equipments. The service pattern water-cart, for instance, is an example of a article surviving years of peace and failing in war. Its elaborate system of filtration, admirable in theory, broke down under the stress of travelling. The remedy practically necessitated reconstruction, a very big item indeed seeing the many hundreds that were involved. On top of water-cart trouble came failure of the axles of travelling kitchens, an unfortunate combination.

It took long before such modifications became operative at a munition factory; and in the interim every equipment that arrived, as well as those already in the country, had to be brought up to date, the necessary materials

being made locally. Then new inventions were constantly being tried, the process usually consisting in a few being made in an Army workshop, after which, if the idea were a success, the base would be called on to manufacture wholesale, at great pressure, making its own patterns, gauges and jigs. For although the War Office might have been asked to provide, it was a lengthy business for a factory at home to switch off its regular line of repeat work and undertake a new process. 8000 anti-aircraft sights, for instance, were turned out in France before a single one arrived from home.

The first large order undertaken at Havre was for 108 95 m/m mortars and their bombs, to a design of Davies', in December 1914, all the materials being got locally. The mortars were of steel piping and the bombs were of zinc filled with gun-cotton, cut to size with an absence of peace-time precautions that fortunately led to no serious accident. There was a great demand for these bombs which were turned out at the rate of 1400 a day. In the following September a sudden call arose for 20,000 special incendiary bombs for these mortars, for operations timed to take place so soon that they had to be despatched within four days to be of avail. Sixty-two separate operations were entailed in the manufacture of each, besides which packages to hold them had to be made; and it was only by working continuous shifts night and day that this order was accomplished; an achievement which well deserved the special complimentary letter that was sent by the Quartermaster General.

This was typical of the usual course of events, first a local improvisation, next a rush order on the base and finally regular supply from home; and if it became unnecessary after a while to make mortars and bombs there was always something to take their place; stabbing knives one day, knobkerries another, braziers a third, Yukon packs, ground-strips for signalling to aircraft, or stove-pipe attachments to conceal the flash of machine guns. The manufacture of a variety of gun components was ceaseless; even for such a delicate piece of mechan-

THE LINES OF COMMUNICATION 109

ism as a gun-trigger France had for long to be largely self-supporting, and items such as pistons, spring cases, and axial vents were made by hundreds at a time. Moreover, besides such special work, unconsidered trifles such as drag-ropes, linchpins and washers, special spanners or bolts and nuts, wagon poles, tent poles, wheelbarrows, handcarts, tables and forms had to be turned out by the thousand.

As for repairs, their nature was endless, and they were as a rule of an extensive character; for the lighter class of work was done by Ordnance mobile workshops, armourers' shops, etc., at the Front. This was particularly so in the case of gun equipments which usually needed complete overhaul by the time they reached the base. From delicate instruments to leather work, from rifles to wagons, the work embraced almost every category of military store or domestic utensil. The fact that the foundry at Havre had to make 17,500 castings in six months to be used for some one or other purpose may convey to the initiated some idea of the scope of operations.

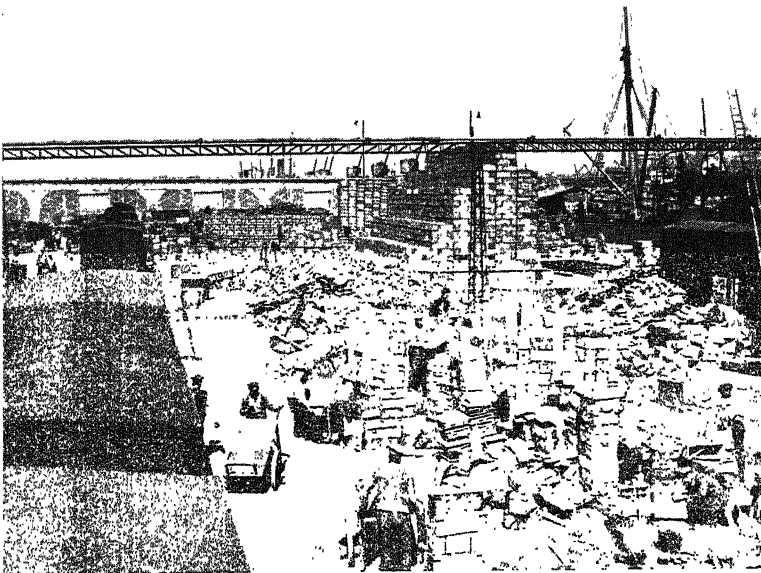
A feature of Calais was the boot-repair factory, the largest organization in the whole world of boot-making. Starting in September 1915 with a staff of 180 boot-makers and an output of 350 pairs a week, the number, including German operatives, increased by 1917 to over 800 with a weekly output of 30,000. Many of the operations, such as re-soling and renewing eyelets, were effected by machinery, and French and Belgian women were employed in sorting out and pairing loose boots and in cleaning and oiling. Some of the hands came from the best West End London firms, and could turn out the highest class of work—even the making of surgical boots. Altogether some four million pairs of boots were made serviceable between the two base workshops.

Another special line of work at Calais, during the later stage of the war, was the overhaul and repair of the railway mountings from which large calibre guns and some of the heavier howitzers were fired, for which a 90-ton gantry was erected.

A quite novel class of work was to repair and re-impregnate the earlier types of respirator. The first device to be improvised when the Germans launched chlorine gas in April 1915 was a simple wire framework of a size and shape to cover the mouth and nostrils, and enclosing a fabric treated with a chemical. The C.O.O. Paris immediately set to work to get these made at the highest pressure. But the device was not a success, for the mask formed a pocket to hold the poison gas which was heavier than air. The Germans, when they decided to adopt this dire form of warfare, had not neglected defensive measures ; and a mask found on a German prisoner a few days later proved to be better. This consisted of a bag filled with cotton-waste giving a much closer fit round the face, and the next step was to obtain all the waste procurable in the area we occupied in France. Meanwhile the first "smoke helmet" was being designed and manufactured at home, a cone-shaped structure of flannelette with celluloid eyepieces, which completely covered the head, the skirts being tucked under the jacket ; and here again our Paris establishment proved of use by purchasing all the stock of cinematograph film procurable to make eyepieces.

So speedily was manufacture set about that very soon it was possible to issue an order that every man going to the front was to have one of these helmets, carried in a waterproof bag to prevent the hypo-sulphate solution with which it was treated from evaporating and the fabric from being torn. Nevertheless the chemical, in liquid form, was bound to evaporate after a few months, and the helmet was only effective against gas for a few hours ; as soon as a sufficiency was available every man was given a second with a third carried in divisional reserve.

It was to re-impregnate and repair these smoke helmets that a new establishment was set up at Abbeville in June 1915, followed soon after by another at Calais, in charge of lady superintendents attached to the R.A.O.C., the first English women to be employed in France, Miss Morgan, Miss Beavor and Mrs. Barocchi.



LOADING AMMUNITION EMPTIES FOR ENGLAND



REPAIRING SMOKE HELMETS

THE LINES OF COMMUNICATION 111

The work consisted of the following operations: washing, drying, repairing tears or refitting eyepieces, redipping under supervision of the medical authorities, and repacking—every helmet being dated so that it might be known when it was due for fresh treatment. The plant—boilers for washing, centrifugal drums for removing excess water, artificially heated drying rooms etc.—was installed by a temporary Ordnance officer, a specialist in laundry work, and the various processes carried out by French women.

Eventually, after various improvements had been made to the smoke helmet, a new device, the box respirator, was adopted, similar in type to the present pattern. The poison gas now filtered through a container holding chemicals in a solid state that could not evaporate, and the reimpregnating stations gradually closed down, but not before a total of 7,677,000 helmets had been dealt with.

The last new workshop was one set on foot to deal with every class of artillery equipment, including the complete rebuilding of gun carriages hitherto only undertaken at home, and was started in December 1917 at Creil, the Clapham Junction of Paris, in the works of the Cie. Gle. Electricité. Munition factories at home were organized with a view to mass production; they shirked this class of work which was mainly one of improvisation, and there is no doubt that Creil might have accomplished good work in time. But before work could be set going on any extensive scale the site became jeopardized owing to the German advance of 1918. It was then proposed to start a new factory elsewhere, but this never came into being as the armistice followed soon after.

It may be gathered from these facts that in variety of services Ordnance workshops were unrivalled in the business world. Starting with one small nucleus shop, the number grew to 73 employing more than 10,000 operatives; while overhauls to artillery equipments either at the front or the bases reached the huge totals of 56,000 guns and 65,000 carriages.

Before closing this chapter, mention is due of some of those chiefly responsible for building up the structure of the main base depots in France ; a structure not only adopted in other theatres and since introduced, as far as it is applicable to peace conditions, at our larger depots at home ; but one also closely copied by America, a nation renowned for its business acumen, when it entered the war. United States officers sent to study our methods could detect no flaw or see how they could be bettered. This was the more remarkable as America, with its great population and wide spaces, is the home of large departmental stores specially designed to supply customers at a distance by means of a parcels' delivery system.

None of these, however, rivalled either in magnitude or scope of operations the gigantic emporia at Havre and Calais which, between them, catered for a constantly shifting population totalling millions, and dealt with goods of almost infinite variety numbering some twenty thousand items ; which had to repair, and not infrequently manufacture, what they supplied ; and which had finally to extract the full residual value from what their clients wore out.

In performing these functions moreover, except the last named, speed and accuracy were vital, error or delay being likely to have very far-reaching consequences in time of war. It was further necessary that documentary records be compiled absolutely concurrently with the transactions to which they related ; had they been allowed to fall into arrears, even for 24 hours, it would have been impossible—as was so often necessary—to obtain a true picture at any moment of the day or night of the stock, assets and liabilities of any particular item. In no other class of business I imagine is such a refinement of accountancy necessary, except a banker's whose account concerns one element in place of 20,000.

The first important innovation was the group system, for introducing which Heron must be awarded the palm, for he had adopted this principle at Aldershot in bygone years, and arrived in France with the idea of doing

THE LINES OF COMMUNICATION 113

similarly. But, in point of fact, the base being then at Nantes, the group system was in process of evolving itself, owing to the storehouses being so scattered from lack of centralized accommodation. And when Havre was reopened Colonel Watts, as Chief Ordnance Officer, retained the group, a depot within a depot, as the main unit of the organization ; a principle that unquestionably proved best for operations of such a varied character. No one would set a fitter to do saddler's work or vice versa ; and though storekeeping involves a less specialized skill, still there is a great difference between being able to identify the particular fittings used with each type of gun and being able to piece together the various bits of leather that go to make up different sets of harness and saddlery, and knowing in each case the exact nomenclature.

Within his group the temporary officer could and did gain a thoroughly practical knowledge of the particular class of store he dealt with to a far greater extent than would have been possible under our pre-war system where everything was controlled from a central office ; and the new army recruit, whose duties were confined to a much narrower circle, was able to do so even more thoroughly. This was the more necessary as there was but a small leaven of seasoned hands, the vast majority having no previous experience of Ordnance work.

It was also at Havre, when re-opened after the evacuation of Nantes, that the system of issuing in bulk was introduced and brought to perfection, another fundamental change that, by decentralizing the process of detailed distribution for certain standard items, gave immense relief ; while other important steps, such as the system of loading trucks, described earlier in the chapter, were adopted.

The advantage of having one central branch to provide for all depots at the seat of war had been realized in the South African Campaign ; and the building up of the analagous organization that proved so successful in France was the work of Colonel Bernard, the first A.D.O.S. Provision. It is impossible to overrate the importance

of this statistical branch of Ordnance work; one continually engaged in compiling and revising figures of consumption and watching that provision is made for every new contingency due to the arrival of fresh troops, fresh types of equipment, the nature and extent of operations and seasonal changes—all factors affecting rates of expenditure.

When Calais was opened as a second base, with Slade Baker as Chief Ordnance Officer, a number of new measures were adopted, profiting by the experience of Havre. It was now that group tallies, kept in loose-leaf ledger form, were converted into group ledgers, and the central ledger office system abandoned.¹ At the same time the forms on which to record assets and liabilities (“dues in” and “dues out” in Ordnance parlance) were recast and simplified and other labour-saving devices introduced—such as the marking up of indents in different coloured pencils to show at a glance their state of completion; short cuts for which Major Marfleet—who had been a group officer at Havre—was largely responsible.

The last to set his impress on the organization was Colonel Trimnell, who relieved Slade Baker when the latter joined the staff of the D.O.S. at the end of 1915, and who continued to occupy the post of C.O.O. Calais till the end of the war. Trimnell had previously been O.O., Havre, where, conjointly with Watts, he had been instrumental in effecting various improvements; he had a high degree of knowledge about departmental work, revelled in working out schemes for increasing the economy of the machinery, and was gluttonous in his eagerness to undertake extra work—expressing a light-hearted conviction that Calais could cater for the whole of the troops in France instead of a paltry half the number. Nor should his celebrated dry curries be omitted from a list of his accomplishments. Calais in fact became the more important of the two bases; for it handled the whole of the gun supply, the most difficult of all the equipments with which the Ordnance had to deal. So smoothly and efficiently was this work accomplished

¹ Calais reverted to the Central Ledger System to the end of the War.

THE LINES OF COMMUNICATION 115

that the French were anxious to learn how it was done, and sent their Inspector General of Artillery to study the system.

It has, of course, been impossible in this survey to describe every dovetailing arrangement, every check and counter-check, or every device introduced to ensure the utmost promptitude and exactitude in connection with each stage passed through between the receipt of an indent and its fulfilment; a space of time, assuming no shortage in supply from England to exist, that occupied normally 24 hours. But all the main processes have been made clear; and the essence of the system may be said to be that it gave everyone, from highest to lowest, a definite responsibility, and enabled specialization to be carried to its utmost limits; the functions of each individual, at any rate in the lower grades, being confined to one particular class of transaction. Efficiency and economy of labour went hand in hand; each officer, warrant officer, non-commissioned officer and man was enabled to pull his full weight, and a redundant hand would have been merely a clog in the machine.

CHAPTER VI

AMMUNITION SUPPLY¹

AMONG all commodities, none bristled with so many difficulties and required such unremitting attention as ammunition. In point of bulk, food and fuel certainly ranked higher, occupying greater space and requiring more transport ; but apart from this the problem of feeding the soldier was altogether simpler than that of providing for his next most vital need. Food was consumed daily in the same quantity as in peace, and to estimate the requirements over any given space of time was a fairly simple calculation. The needs of every man and horse were similar, should some one item going to make up the ration be short another might be substituted, and in case of breakdown there was always the possibility of getting temporary assistance from France.

For ammunition, the conditions were the reverse. Expenditure was on a scale undreamt of and irregular in the extreme, not only at different times but in different sectors of the front. As each arm had its own special types, no substitution was possible ; and no assistance could be got from the French. The hazard of a temporary interruption in our communications with England could never be ignored and this, combined with the huge consumption when hostilities were active, made it necessary to hold gigantic stocks in France, where there was always risk of this highly dangerous and valuable materiel being destroyed by air raid or even gun fire.

Food-stuffs are comparatively simple to deal with ; to understand the technicalities of ammunition requires expert knowledge, and the officers and men of the new Army engaged in this line of work had to be specially trained.

From only one aspect does food present a difficulty not inherent in other commodities—perishability. But even here the ammunition made in the Great War was at a discount compared with that normally manufactured. The substitutes for our ordinary explosives that had to

¹ In writing this chapter I have been helped by Colonel Oldfield, D.S.O., R.A.O.C.

be improvised to obtain the vast quantity required were subject to rapid deterioration, and it was impossible to protect them adequately from the effects of damp or high temperature by packing in special hermetically sealed cases as in peace times. War time packages were flimsy and barely waterproof. Even covers for time fuzes had for long to be dispensed with so as to speed up production, though the rate of burning and consequent accuracy of the fuze was bound to suffer unless it was promptly fired.

* * * * *

The arrangements for supply, as we left them in the first chapter, were as follows. The base stock was held at Boulogne, the port of entry, which fed two trains, staffed by Ordnance personnel, situated at Arques and Aire. At these railheads ammunition was transferred to mechanized ammunition parks which carried the supply as far as the refilling points where they replenished the horsed wagons of ammunition columns—these latter being divisional organizations. The whole arrangements for supply up to the refilling points were controlled by the D.D.O.S. G.H.Q. under instructions from the Q.M.G.

The formation of Armies led to a modification of this system. The ammunition trains were moved rather further forward to St. Venant and Strazeele which became respectively the railheads of the 1st and 2nd Armies who were each allotted certain of the ammunition parks, so that G.H.Q. control now ceased at railhead. The other parks remained under G.H.Q., forming, together with three trains stabled at or near St. Omer, a mobile reserve available to reinforce either Army. In the spring of 1915 each Army was provided with a second subsidiary railhead train, mainly for use during active operations.

The French system of ammunition supply provided for an *en cas mobile*, a first reserve on rail, being held at the regulating station; and we greedily adopted and extended this plan, every round of ammunition in France, even at the base, being at first on wheels, with a golden

rule, that each truck should contain complete rounds—cartridges, shell, tubes and fuzes. This packing was adopted so that if any trucks were cut off owing to a hot axle-box or other cause, the remainder had each its full complement of rounds ready for immediate use. Indeed this extreme fluidity followed almost as a matter of course. So scanty was the stock that what arrived at Boulogne one afternoon would as often as not go forward the same evening to be issued from railhead and perhaps fired the next day.

By the summer of 1915 however, when a slightly better stock had been accumulated, the French began naturally enough to take exception to so many railway trucks being permanently locked up, and the stock at Boulogne was placed under shedding. But as intelligent advanced loading was still permitted in anticipation of orders, a good quantity of what was wanted from day to day was always available on rail. At the same time the increasing stocks at railheads began to be dumped under cover, and the ammunition parks off-loaded their contents, which were stacked partly at the divisional refilling points and partly at Arques where a 2000-ton reserve depot was built.

There has been acrimonious discussion as to the responsibility for the stringency of ammunition in the early days of the war, to which it is unnecessary to add beyond saying that no one in France concerned with its supply but was acutely aware of the shortage from as early as October 1914. In particular, trench warfare created a quite unexpected demand for high explosive shell.¹ Shrapnel, till then the sole projectile of our field gun, was comparatively harmless against troops in trenches, and nothing could be more distressing for infantry than to be exposed day after day to a harassing fire, to which our artillery was unable to make any effective or adequate reply.

So meagre was the supply that the expenditure of every single round had to be watched. The midday stock at each railhead and the base was telephoned to D.D.O.S.

¹ It was actually in September 1914 that high explosive shell were first demanded for field guns and half and half H.E. and shrapnel for 4.5-inch how, and 60-pdr,

G.H.Q., where a tabulated statement was prepared showing the complete situation ; and, with this before him, the Q.M.G. would himself decide how many rounds could be spared for the following day, at first not more than half a dozen per gun as a rule, or it might be even none if the position were worse than usual. The railhead Ordnance officer was originally allowed to increase the figure should the situation seem to warrant such action, but even this latitude was withdrawn as it was found that he was apt to succumb to the blandishments of a staff officer pleading the dire need of a little extra. At the same time as the D.D.O.S., who had advice of what was on the way from England, transmitted the Q.M.G.'s orders to railhead, he would instruct Boulogne what quantity to send up in replacement, which would often come straight from the ship's hold.

Unremitting attention was needed to ensure that the supply at railheads did not actually run dry and at the same time conserve some small quantity in hand in case of emergency, especially when any heavy fighting was in progress.¹ As late as the 15th May, 1915, there was not one

¹ The following extracts from Colonel Mathew's diary as D.D.O.S. G.H.Q. convey some conception of the constant anxieties, curt and bald though they be. "9th May, 1915. Attack started 5 a.m., immediately followed by large demands for ammunition. Instructed Ammunition Train Officers not to send to reserve train without authority from me. At 9 a.m. finding stocks at St. Venant running low, diverted ammunition parks to Berquette [reserve train], and arranged for special train from Boulogne. At 10 a.m. informed by 2nd Army of heavy attack on salient. At 11 a.m. Abeele [the second train formed in 2nd Army] wired for 4.5" lyddite, but none available except a small supply in reserve parks and reserve trains which C.G.S. has directed be reserved for 1st Army. At 11.30 a.m. ascertained stocks at Abeele and Strazeele were getting low, and arranged with Director Railway Transport for a special from Boulogne, and sent loading instructions to C.O.O. At 1 p.m. rung up by 1st Army, agitated about supply as two first attacks had failed, gave them the position. The ammunition train for St. Venant left by about 2 p.m., but that for Strazeele had not left Boulogne at 11 p.m. C.O.O. wired to say loading hampered as all lights extinguished on account of Zeppelin scare."

Not only, it will be observed, were railhead stocks exhausted and G.H.Q. reserves largely depleted as well, but the 2nd Army, attacked in the Ypres Salient, had to be refused any further quantity of howitzer ammunition.

round of 4.5 inch or 18-pr. high explosive left on the lines of communication and only 24 rounds of 18-pr. shrapnel per gun.

Thereafter a slightly better stock was gradually accumulated by careful hoarding. The 3rd Army was formed in the summer of 1915, its ammunition railhead being installed at Flesselles, with a reserve stabled further to its rear at Abbeville, the regulating station.

Even so early as December 1914 however the decision to duplicate the line of communications, combined with the risk of having all our eggs in one basket, made it advisable to look out for a second port of entry and ammunition depot in the Southern zone to correspond with Boulogne in the North.

From the outbreak of the war all the elaborate peace precautions for the storage and movement of explosives, whether governed by War Office, Home Office or Board of Trade regulations, were ignored to conform to the dictates of military operations. Necessity knows no law and risks had to be faced. No attempt could be made to isolate explosives; they were dumped at the ports of entry. Moreover high explosive shell were in their infancy, no piece greater than the six-inch howitzer existed and no one had the faintest conception of the vast scale on which ammunition would come to be stored.

The quantity that it was originally estimated would be held at Boulogne was 5000 tons, which it was proposed to house in sheds on the quays together with other stores; and in the same way the site selected for the second depot, at Rouen, was that employed at the time to provide local troops with stores and clothing. This had its quay on the river and possessed railway sidings, and it was proposed to store the ammunition cheek by jowl with other commodities, by the process of building a few extra sheds and railway lines. The ammunition depot at Rouen in fact, like that at Boulogne, was determined upon at a time when nothing was contemplated but the holding of a small stock of ammunition of a comparatively high degree of safety, mainly small arm ammunition and

shrapnel, with a few thousand lyddite shell at the most ; all manufactured to strict specification by trained hands and carefully inspected by experts before leaving the factory.

By the summer of 1915 however, long before the stock was sufficient to divide between two depots, the advent of heavy high explosive shell, with a variety of new bombs and grenades, made it necessary to explore a fresh site for a depot on the southern line. At Boulogne certain precautionary measures had been taken by removing explosives in bulk to an isolated area and storing heavy shell apart under bomb-proof cover ; but nothing of this sort was possible at Rouen, where the depot was in the heart of the town and incapable of expansion, so that an accident might do incalculable damage.

It was then decided to prepare a new depot at Quevilly, some four miles down the river on the left bank. This entailed the erection of sheds, laying of railway lines, and building of wharves ; and Quevilly was thus the first depot specially planned to deal with ammunition on a large scale in the most rapid manner possible. At the wharf were sorting platforms to facilitate the assembly of complete rounds and the railway lay-out was very carefully thought out. Quevilly however was an isolated site, there was much less danger of an air-raid than at Boulogne, and no special precautions such as the erection of bomb-proof cover were undertaken. The depot merely consisted of a series of sheds at such distances apart as to admit the laying of running lines and sidings alongside of each.

The new munition factories once at work, output began to increase very rapidly, and in December 1915 forecasts of what might be expected by the following spring caused new schemes for storage and supply to be prepared on a greatly extended scale. It was calculated that by the next summer what seemed then the incredible figure of 100,000 tons of ammunition might have to be stored in France, and 5000 tons despatched to the front in 24 hours. On the northern line it was decided to build a new inland depot at Audruicq to hold 20,000 tons and

capable of sending up 2500 tons a day which would become the issuing depot, fed from Boulogne where approximately the same quantity would be held in reserve. On the other line the depot at Quevilly had a capacity of 44,000 tons and could deal with 2500 tons a day; and the French were approached with a view to our acquiring an additional central site in the neighbourhood of Abancourt for a further reserve.

Audruicq marks a further stage in progress. Hitherto the principle had been to hold the entire stock at the port whence it could be quickly evacuated in case of need. The plan was also convenient when supply was very limited and the contents of a ship might have to be hurried forward. But with a more plentiful supply and a position of greater stability, it was preferable to hold such dangerous goods away from the docks in areas selected on account of their sparse population and where new constructional work presented no great engineering difficulty, the planning of the depot being largely governed by the need of ample railway facilities on account of the very large amount of traffic constantly passing through. At Audruicq the congeries of railway lines, or "trriage," where all the marshalling of traffic took place, was in the centre of the depot, the most convenient spot from this aspect; and spurs ran off to each group of sheds, of which those intended to hold heavy shell had their floors raised to truck level. In deciding on the plan of this depot there were two opposing considerations; speed of work which implied concentration, and safety which involved dispersion; and though the latter was not disregarded, for the sheds were separated by what were then considered adequate intervals and provided with sandbag protection, no experience had been gained of the effect of ammunition explosions and it was the former factor rather than the latter that received the most attention.

Increased output also resulted in greater decentralization of supply, Armies being given control of their railhead stocks on the 1st January 1916. The Senior Ordnance Officer at the main Army railhead then joined the

D.D.O.S. of his Army where he supervised the technical side of the work, controlled and co-ordinated the work of the Ordnance officers at the railheads which began to increase in number, got daily returns of their stock, and settled in conjunction with the "Q" staff what quantities should be demanded daily for each.

At G.H.Q. the extent to which these demands were to be met was worked out by an officer of the Q. Staff (Col. Lyon) in conjunction with the D.D.O.S. G.H.Q., who had the ammunition statement in front of them shewing the situation of every round up to and including railheads—G.S. being consulted when necessary.

Meanwhile supply had improved sufficiently to allow part to be diverted to Rouen, where it was stored temporarily in the old depot in the town until the beginning of March 1916, when the new depot at Quevilly with its wharves, sheds and railway lines was in a sufficiently advanced state of construction to handle ammunition.

On the 10th March, when unloading the second train-load to enter the new depot, a box of 4.5-inch ammunition exploded; and, in spite of efforts to extinguish the flames, the fire spread, wrecked a considerable part of the depot and resulted in the loss of three lives.¹ It was afterwards found out that ten rounds of this ammunition had been dropped when loading the ship at Newhaven, and the accident was probably due to a faulty No. 100 fuze, the first specially designed for the new high explosive shell, and one which led to trouble on several other occasions.

There were at the time only 600 tons in the depot and the actual loss of ammunition was very trivial. Strange to say a stack of 3-inch mortar bombs into which shell were actually flung by the force of the explosion failed to ignite. Nevertheless the accident was extremely disturbing. The old depot at Rouen was at the moment almost literally a solid mass of nearly 20,000 tons of explosives;

¹ Lieutenant Reed, A.O.C., who was in charge, stuck to his post with great gallantry amid the continued explosions and was awarded the M.C. for his efforts to quench the fires.

an accident there would have wrecked the town, while at Boulogne a similar happening would in addition have closed one of our principal ports. Ammunition was for the first time arriving at a rate sufficient to meet all ordinary day to day needs and at the same time to begin building up a stock for a summer offensive, and it was imperative not to stop the flow even for a day. The stream could only be dammed by diminishing output, for no accommodation yet existed at home for what was made.

The first immediate step was to direct the whole supply on Boulogne, despatch as much as they could take to Army areas from the old Rouen depot, and remove the rest to that at Quevilly, much of which was undamaged, as soon as the debris could be cleared away. At the same time it was decided that Boulogne, now coping momentarily with a double dose of well over 1000 tons a day, must be evacuated of its large calibre shell with all speed ; and here, fortunately, the partially built new depot at Audruicq could afford relief. Some of its sheds were ready, and shell were stacked in the intervening spaces.

The War Office experts who investigated the accident at Quevilly advised that the stock be distributed among a large number of small depots in parcels not exceeding 2000 tons, that cartridges, fuzes and tubes for the larger natures be kept at a distance from their shell, and that no shed be nearer its neighbour than 70 yards ; but this was a counsel of perfection. The vast scale on which ammunition was beginning to be dealt with, and its great variety, made it out of the question to meet demands from the front through the medium of a number of very small depots—traffic difficulties, apart from any other considerations, ruled such a proposal out of court ; and to store shell and their cartridges at a distance from each other would have increased the time and labour of loading up complete rounds. To site sheds 70 yards apart would reduce the capacity of Quevilly and Andruicq, and though it was decided to even increase these distances if possible, at the moment risks had to be faced and ammunition dumped wherever space was to be found.

At the same time sites for additional depots were being explored. That at Abancourt, Blargies Nord, had been demurred to by the French, who wished us to go to Critot where levelling operations alone would have taken six months; but now they agreed to fall in with our views. Constructional work was pressed on, but as it would be impossible for Blargies Nord to be ready before July, a temporary dump was formed at Blargies Sud, where a depot was being prepared to hold sandbags and other trench stores on behalf of Havre. A sugar factory at Martainville, capable of holding 15,000 tons, which would be empty till the beet crop was garnered, was also taken up.

These shifts and expedients sufficed to give temporary breathing space, for soon afterwards preparations began for the battle of the Somme, the first great operation of the war for which an abundance of ammunition was available. The 4th Army had been formed by now to conduct this offensive (in which the 3rd also shared), and was given practically carte blanche to draw what it pleased and dump it where it liked. With a warning of only three days the two depots at Rouen had to increase their daily output from 200 to 3500 tons, and Audruicq, as soon as it was sufficiently well stocked, took its share in the work, besides meeting the demands of the 1st and 2nd Armies. The scale on which ammunition was consumed in this operation can be gauged by the fact that the expenditure in one month, from the 24th June, 1916, to the 23rd July, amounted to 148,000 tons. During the same period the quantity landed in France was 101,771 tons so that the gain in space was equivalent to 46,000 tons.

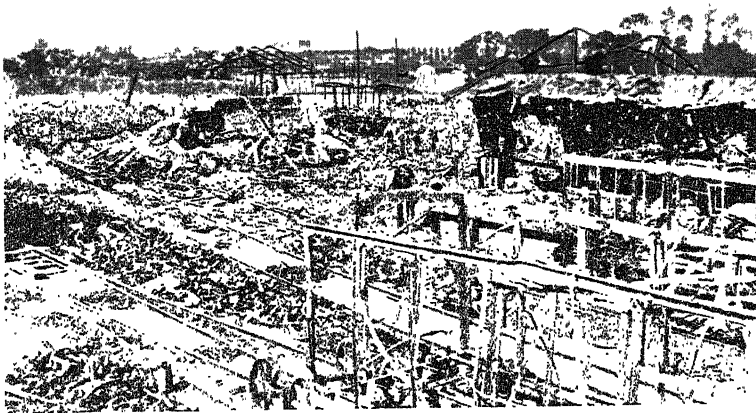
In the midst of this rush of work, on the night of the 20/21st July, 1916, Audruicq was visited by an enemy aeroplane and placed out of action by one small bomb which wrecked the entire depot. It says much for the organization that the work of feeding the front went on without an hour's interruption; the Armies suffered not the loss of a single round, every order arriving to

scheduled time as if nothing had happened. The previous day's loading had been completed and all trains despatched before the accident occurred, and when the next day's demands arrived at G.H.Q. the ammunition statement, showing the situation of every round, made it possible to order from elsewhere what would have been despatched from Audruicq; Boulogne becoming once more temporarily an issuing depot.

This accident was a far more serious affair than that at Quevilly. The depot held 9000 tons; and trucks, of which there were a hundred or more always under load, acted as quick-match, carrying the fire from one group of sheds to another. The destruction was stupendous. Stacks of heavy shell detonated, boxed ammunition went up in a blaze of flaring cordite and exploding shell, and the major portion of the trench munitions disappeared off the face of the earth. One crater would have served as a vent for a respectable volcano, another of oblong shape, sixty feet deep, might have docked a battleship; while barographs miles distant recorded the violent fluctuations of air pressure due to the recurrent explosions. The clearance of the debris was a highly dangerous job that took several months to effect, fortunately without serious accident.

Although ammunition to the tune of three and a half million sterling was lost, that sum actually represented less than half the value of what was being expended in a week's heavy firing; and the accident, following so soon after that at Quevilly, proved in reality a blessing in disguise. It led to the adoption of an entirely fresh lay-out for an ammunition depot on a greatly extended scale.

There were four different types of risk, or five including the triage. The danger in the case of boxed ammunition lay in complete rounds being packed in wooden boxes. Should one round explode, the fierce flame of the burning cordite would set alight the neighbouring boxes and so destroy the whole stack. For the field gun this was unavoidable, the ammunition being all in one unit; but, as a measure of safety, field howitzer cartridges,



WRECKAGE OF AUDRUICQ AMMUNITION DEPOT

which could not be fixed to the shell as the charge was variable, were from thence onwards enclosed in a separate package. For heavier gun ammunition there was not this risk, each component being a separate unit. Here the danger lay in the immensely destructive effect of the shell and the distance to which fragments would be hurled. After the explosion live shell were picked up two miles away. The third type of risk was that from trench munitions, a stack of which was a solid mass of high explosive, divided merely into compartments by the comparatively thin envelopes of the bombs, so that an accident was likely to result in the instantaneous detonation of the whole, producing a highly dangerous detonation wave. Lastly were chemical munitions, lethal, lachrymatory and incendiary projectiles, not in themselves destructive, but the first type dangerous to life and the last burning so fiercely as to constitute a very serious fire risk. The danger from the triage was that loaded trains would carry a fire from one portion of a depot to another.

As a result of the explosion at Audruicq a new design was decided on in which separate areas were allotted for boxed ammunition, component ammunition, trench munitions and chemical munitions, each distant at least a quarter of a mile from its neighbour and with its own sheds well dispersed. There were also to be separate sites for the triage, the laboratory and the magazine where explosives in bulk were held. A master switch enabled the whole of the lights all over the depot to be instantly extinguished should hostile aircraft be signalled, and another controlled those in the triage. False sites were created in some cases several miles away which were lit up when an air raid was expected, the real depot being kept in darkness; while deeply buried water mains, tanks, hydrants, extincteurs, water buckets and hand pumps were lavishly provided. Sheds for boxed ammunition were covered by sandbags which not only helped to keep out fragments of shell or bombs; but also, owing to the spilling of sand if the roof was penetrated, helped to smother a fire.

At the same time a standard size was adopted.

Boxed ammunition	16,000 tons
Component ammunition	12,000 „
Trench ammunition	3,500 „
Chemical and incendiary ammunition	2,000 „
Small arm ammunition (stored wherever convenient)	1,500 „
	<hr/>
	35,000
	<hr/>

Quevilly and Boulogne were now abandoned as depots ; it would have been fatal had an accident occurred at either of our ammunition ports. At Blargies Nord, now in full work, it proved impracticable to reconstruct the depot according to the latest plan ; certain modifications were made, and the danger reduced as far as was possible by the construction of gigantic sandbag traverses. At Audruicq on the other hand, which was once more functioning on a limited scale by August, the wreckage was reconstructed so as to conform fairly closely to the new safety limits.

Meanwhile the relief afforded by the fighting on the Somme would be spent by the autumn. The volume of receipts was continually on the up grade, the forecast of shipments for the summer of 1917 amounted to 8300 tons a day, and it was calculated that storage accommodation must be found for 200,000 tons. Extra ports of entry besides Boulogne and Quevilly were needed to cope with this traffic, and extra depots besides Blargies and Audruicq to hold what arrived. Armies were instructed to find sites in their back areas and build depots of some 10,000-ton capacity each, to hold a portion of the stock. These reserves, though perhaps necessary as a relief, were a great incubus. They were insufficiently close to the front to be of use to Armies, and yet not far enough to the rear for security in case of retreat. Their stocks were locked up and seldom turned over, and they absorbed a considerable staff that might have been more profitably employed in active work.

On the lines of communication it was decided to build four new depots, though to find suitable isolated sites was no easy matter. Level or easily workable ground was a necessity for railway construction and the area covered under the new restrictions was vast. In the original designs of Audruicq and Blargies the proportion of unoccupied ground to shed was as three to two, while now the figures were twenty to one. However suitable sites were found and before the end of winter of the 1916/17, when the stock once more rapidly accumulated, each line possessed three 35,000-ton depots—Audruicq, Zeneghem and Dannes in the North; Blargies, Rouxmesnil and Saignville in the South.

Dannes, situated among the folds of sand dunes and copses south of Boulogne, was an ideal site, so hard to discover from the air that it was never once attacked, and capable of almost indefinite expansion. Zeneghem was chosen owing to its proximity to a canal debouching both at Calais and Dunkirk. Ammunition usually arrived there by barge, wharves being constructed where the canal adjoined the depot, with a railway connecting the two and the French main line. The advantage of having Dunkirk as an alternative port was proved at Christmas 1916, when the entrance to Boulogne was blocked for a week by a sunken vessel. A portion of the Corps ammunition staff was transferred from Boulogne to Dunkirk where the ammunition ships were diverted, their contents being forwarded on without checking supply from home for even one day. Rouxmesnil was on the outskirts of Dieppe from which port it was served. At the request of the French this depot, owing to its proximity to the town, held no trench munitions, its capacity being reduced accordingly. Saignville, lying in the valley of the Somme west of Abbeville, could be served by either Quevilly or Dieppe. The daily supply was distributed as follows: Quevilly 3000 tons, Dieppe 2000, Boulogne 2300, Zeneghem 1000.

By the time these new depots were built further experience had been gained, and they were equipped with many labour saving devices. Sidings were laid on either

side of the sheds so that receipt and issue could proceed concurrently, and at either end of a shell store would be small sheds for cartridges, tubes and fuzes, connected with the shell store by light railways to facilitate loading. In fact in some there was a very extensive system of inter-communication by light railway with a corresponding relief to man-power. The new lay-out moreover provided all reasonable security. Information was received in January 1917 that the enemy intended to make a special feature of bombing these depots, and that so few attacks were made and so little damage done may be fairly attributed to the policy of extension and protection resulting from the Audruicq explosion. Although hundreds of bombs were rained down by night on several occasions which caused small explosions, it was rarely that the fires spread and caused serious destruction. Only once was a depot so badly damaged as to be put temporarily out of action—that of Blargies where the central area always remained congested as it was impossible to introduce the new safety distances.

These six 35,000-ton depots, however, by no means represented finality, each in turn was enlarged by the addition of one or more extensions. By 1917 a maximum daily intake of 10,000 tons had to be provided for and Dunkirk was added as a regular ammunition port.

The accommodation eventually available was :

Audruicq	44,000 tons
Zeneghem	49,000 „
Dannes	65,000 „
Blargies	64,500 „
Rouxmesnil	49,000 „
Saignville	60,000 „
	<hr/>
	331,500 „
	<hr/>

If to this be added what was held in depots and dumps in Army areas, the stock of ammunition in France was in the neighbourhood of half a million tons. And even

then sites for additional depots were being explored, one at Bourbourg and another at Conteville being in process of construction at the time of the Armistice.¹

Stated in bald terms of tonnage, to cope with this volume of ammunition may not seem so difficult, but when the great variety in types is taken into account, to arrange for distribution in the correct proportion first from England among the ports of entry, next from these ports among the depots, and lastly from the depots among the numerous railheads, was a very complicated business.

In examining the procedure the reader will do well to consult Appendix VI which gives the first ammunition statement ever prepared in France and a specimen of the daily balance sheet later compiled by Captain Warde, a temporary officer and bank clerk in civil life, whose gift for figures and speed in calculation were truly marvellous. This document would be ready at about 5 p.m. by which time demands from Armies, based on their own stock returns and figures of expenditure, would also have been tabulated out, showing what was required at each railhead; there being eventually some 120 railheads, though it was seldom that a quarter were in active operation at the same time.

To get the maximum efficiency in haulage, supply was limited to complete train-loads of 370 tons, and another limiting factor was the maximum number of trains that could be worked on any line of rails. This was not a fixed quantity, it depended on whether the route was a straight run or involved a cross-country journey; thus a depot might be able to despatch eight trains to one Army, plus six to a second and two to a third, but the numbers would be different if the destinations were changed. Each depot had its limits, with interlocking combinations depending on the output of trains from others. A further complication was that trains from Rouxmesnil could only take 290 tons, being on a light

¹ The tonnage shipped to France, month by month, is given in Appendix V.

branch line, and that no demand for trench munitions could be met from this depot.

Each nature of ammunition had its code letter and was dealt with on a truck-load basis, i.e. 1.A. signified one truck of 800 rounds of 18-pounder shrapnel, and 2.B.X. two trucks holding 900 rounds of 4.5-inch high explosive. For natures such as these there was no great difficulty; all that had to be aimed at was to try and distribute the work evenly between the six depots, a little more or less to make up complete train-loads being immaterial.

The difficulty in framing the daily programme occurred in the case of specialities such as long-nosed shell giving extra range, reduced charges to save the life of the gun, or those with no flash which were used by night from exposed positions, special fuzes or gas shell, etc., of which the stock was insufficient to ensure each depot always having its quota. For instance, after fitting in everything nicely, it would be found that one railhead required a few 9.2-inch shell of some particular type held only at Dannes from which the maximum number of trains was already earmarked. This would entail the transfer of some other train—say to Audruicq—only to find that this was destined to carry some lethal shell of which Audruicq was deficient. To supply this would involve a call on Blargies, introducing a fresh combination of trains that upset everything. Then the whole programme, involving the building up of perhaps forty trains, would have to be considered afresh and recast. It was like solving a jig-saw puzzle.

Another intricate job was to adjust the supply from home so that each depot maintained its fair share; for, with the best will in the world, there was always a drain at some one or other to be corrected. And here it was not enough to alter the proportions in which one type of ammunition was being distributed from home; as the ports of entry were working to their full capacity, any increase had to be balanced by an equivalent reduction in tonnage of other species.

Turning next to those who had to carry out these

elaborate programmes. On each of the two lines of communication was a C.O.O. Ammunition responsible for the whole organization, Colonel Bainbridge on the north and Colonel Oldfield on the south—Tweedledum and Tweedledee, to give them their nicknames.

At the outbreak of the war, ammunition came out in complete rounds, but once the new munition factories got busy this ceased except for boxed ammunition, as the various components were made by different factories. Shell, cartridges, fuzes and tubes would arrive in varying quantities, their marriage taking place when loading up at Boulogne and Quevilly. In time this complication disappeared and the marriage was consummated at the home port.

But now there were other ties to be made to ensure that each group of guns should get ammunition ranging as closely as possible alike. Boxed ammunition was sorted by type of propellant and for fuze setting correction in the case of shrapnel ; for heavier natures cartridges were sorted not only by propellant but by the lot or group of manufacture and shell by their type of driving band and fuze hole, the same lot or type being earmarked for the same railhead. Further, once supply became plentiful, it became important to issue the oldest ammunition first to guard against deterioration. For these various reasons the practice of loading up trucks on the wharf for delivery direct to railhead ceased.

Here it may be said that the Docks Directorate, though it essayed to do so, found it impossible to take over ammunition work at the port as it did for other classes of goods. Sorting began in the hold and was continued on the quay side, the markings on ammunition packages were meaningless to the uninitiated, and the services of an Ordnance staff were essential to supervise assembly and consign the right sort in the proper proportion to the correct destination. Of 9·2-inch shell alone there were eleven different types.

The ammunition depot was divided into groups, each in charge of an officer—one for boxed ammunition,

one for medium, one for heavy, etc.—and the officer in charge of the depot allotted each group its daily programme of work, according to the orders received from G.H.Q. and advices of what was due from the port. Then the group officer had to arrange for trucks and labour to fulfil his programme through the Ordnance Traffic and Labour officers, whose operations were a very important factor in the work.

A close liaison was needed with the Railway Operating Staff to ensure that incoming trucks were shunted to the right shed to be off-loaded, and empties placed at the right spot and right hour to meet the daily orders. A time table for marshalling and despatching the trains was drawn up and each group had to see that its trucks were ready at the appointed hour.¹ After loading, each truck was sealed and labelled with the code letters representing its destination, and a telegram sent to the railhead Ordnance

¹ The following table shows the day's work at Blargies on the 4th April, 1917, a heavy programme.

Railhead	Army	Ready for Marshalling	Time due to leave
O.C.A.	3rd	8.30	12.03
Bapaume	5th	8.30	13.23
O.C.	3rd	8.30	13.53
O.C.A.	3rd	8.30	14.33
O.C.A.	3rd	10.15	19.03
O.P.C.	1st	24.00	0.23
O.P.B.	1st	14.30	1.33
O.P.B.	3rd	19.00	2.53
Scarpe Valley	1st	19.00	3.23
O.C.	3rd	24.00	4.33
O.C.A.	3rd	24.00	6.43
Bapaume	5th	23.00	6.43
O.P.D.	3rd	23.00	8.03
O.P.D.	3rd	7.10	11.03
O.C.A.	3rd	23.00	12.03

The first railhead trains were O.A. and O.B.—the series being extended. When a main railhead, such as O.P. threw out offshoots they were christened O.P.A., O.P.B., etc., as shown in the table above. Bapaume and Scarpe Valley would be temporary railheads not so far allotted code letters.

officer and repeated to army headquarters giving the contents of each train, saying when it was due and quoting the number of the truck in which the waybills would be found.

The distribution of labour was another matter that called for close regulation according to the fluctuating needs of each group. As soon as man-power became short, the sturdy A.S.C. Labour Companies were replaced by coloured labour of a very mixed character—Kaffirs, Cape boys, Egyptians, Chins, Manipuris and in particular Chinese. Besides a supervisory staff of 4000 of the Corps some 12,000 hands were eventually employed. All classes, black or yellow, worked well ; though the Chinese, once language difficulties were overcome, were the best. They required careful handling, having an independence of their own and a considerable trade union spirit ; but when their idiosyncrasies were studied and they were treated courteously though firmly they proved most responsive, and showed great ingenuity in devising means of reducing work and increasing output.

For this miscellany of races task-work was usually employed, the gang being allowed to knock off when it had done its allotted job. Once the advantages of this plan were realized it was extraordinary how quickly the Chinaman in particular found he could get through his task, though a close supervision was needed to ensure that such dangerous goods were handled with a proper care.

No sooner had one gang finished its job than it would be relieved by another ; work, in times of pressure, being continuous throughout the 24 hours ; and there developed a very keen inter-gang emulation, each trying to beat the other in point of time. It was wonderful also how adept these native races became in deciphering the very intricate markings that distinguished similar packages containing different marks of fuze or types of propellant.

Ledgers have three main uses. They serve as a record of quantity, as a safeguard against loss, and as a statistical record from which various information can be obtained,

such as average expenditure; but for ammunition in time of war their compilation proved to be a waste of time.

The stock of every nature had to be available at any hour of the day or night, and changed so constantly that the only reliable record was that in which every incoming or outgoing train was at once booked up. By the time a voucher charging off a consignment from some establishment in England could be dealt with the ammunition itself might have been expended against the enemy; and to raise a discrepancy on a supposed shortage was out of the question, for it was impossible to say from which of the numerous factories at home any one particular round originated. Ammunition was not liable to pilferage, it was safe to say that what arrived reached the proper hands, and statistics of consumption were to be had from figures of the numbers of guns in the country and their expenditure.

With the concurrence of the Financial Adviser, the daily ammunition statement prepared at G.H.Q., which showed the stock and the balance of profit and loss, was accepted as a consolidated ledger record, a process that saved much useless clerical labour and beating the air in trying to square individual transactions with their documentary evidence.

So far ammunition has only been dealt with from the point of view of supply and demand, receipt, storage and issue; the technical side of the work remains to be described.

The first trouble occurred at the very outbreak of war, due to our pistol ammunition having a flat nose which made it resemble an expanding bullet, a type banned by the Geneva convention owing to the ugly wound caused by its setting up. A rumour spread that the Germans were shooting prisoners found in possession of this ammunition and, though unsubstantiated, ammunition with a pointed nose was adopted to restore confidence and because the enemy might adopt a bullet that set up in retaliation.

The next trouble was far more serious, an epidemic of prematures with high explosive shell, bursting guns and causing loss of life to their crews. The first outbreak, in March 1915, was traced to the No. 4 graze fuze, which had to be modified by attaching a small brass disc to the end of the centrifugal bolt to prevent play between the bolt and detent plug. In the following August there was a more serious outbreak caused by fuzes improvised for the new amatol filled shell. To render these safe necessitated the removal of the time pellet ; by now the stock was more plentiful, special tools were made and the work of conversion pressed on with at top speed, not only at the base and railheads, but also further forward under supervision of the railhead Ordnance officers.

While this defect was actually being investigated, there arrived at G.H.Q. a report from the Third Army that a certain make of small arm ammunition gave trouble in extraction from rifles ; the fault was confirmed and all of this nature had to be withdrawn. Six days after this came to light, the War Office telegraphed for all igniters for one of the new grenades to be sent home as they were defective ; and from this time onwards it may be said there was never a time when some type of ammunition was not under suspicion. One day it would be found that a phosphorus bomb was liable to spontaneous combustion, and the whole stock would have to be emptied and refilled; the next would disclose that a particular mortar cartridge gave rise to prematures ; on another it would be a fuze mechanism made in Switzerland that was defective, or a flare whose chemicals were liable to decompose ; one serious matter requiring constant attention in summer being the liability of the filling of heavy shell to exude owing to heat, the exudation forming a dangerously explosive film that needed care and skill to remove.

It would be unfair to blame the Ministry of Munitions for these defects. Designers were constantly called on to produce some novelty at a moment's notice which there was no time to test properly, and production was on an unprecedented scale with amateur staffs. But the result of these failures was that laboratory operations were in

constant progress at each of the base depots¹; besides which there was always work to be done in the way of reconditioning and effecting minor repairs to ammunition returned from the front.

In time of peace work of this sort was conducted solely by officers and N.C.O. laboratory foremen trained as ammunition specialists. But the supply of trained men quickly ran dry, and France had to educate its own ammunition staff, schools being set up at Zeneghem and Blargies. The instruction was both theoretical and practical. Types of German ammunition were described so that it might be known how to treat it when captured, and pupils were taught how to blow up blind shell. In all 432 officers passed through these schools, including those from Canada, Australia, New Zealand and the United States, besides far more numerous junior ranks.

Over and above the ordinary laboratory with which each depot was provided, two much more extensive repair factories were created, capable of undertaking operations which, in time of peace, were attempted nowhere outside of Woolwich Arsenal. The first of these

¹ The extent of the work can be judged by the following list of major operations carried out during three months of 1917.

(1) 1,040,000 rounds of 3-inch Stokes mortar ammunition examined to discover pistol heads with unflanged levers.

(2) 1,000,000 rounds 3-inch Stokes mortar ammunition examined to discover and set aside Mark I bombs.

(3) 675,000 Mills grenades examined and iron plugs substituted in those having brass or aluminium plugs.

(4) All plugged H.E. shell examined for exudation.

(5) Final return to England of defective 18-pr. H.E. ammunition of B.S.C. manufacture. 775,000 rounds of this nature in all had to be sorted out and sent home.

(6) 64,000 No. 24 rifle grenades examined to discover if blue copper ammonium nitrate had formed in the striker way.

(7) All 4-inch Stokes mortar bombs examined to ascertain whether the percussion primer was reinforced.

(8) Leaking M.S.K. grenades emptied and 26 gallons of lachrymatory reagent recovered, a valuable product.

(9) All 112 lb. aerial bombs equipped with 52 grain exploders.

(10) Augmenting strips fitted to all 12-inch howitzer shell.

(11) Exchange of fuzes for all 3-inch 20 cwt. ammunition, H.E. and shrapnel.

was at Boulogne where a special plant was installed in the isolated area originally set apart as a magazine. The operations were of a very varied character. An immense number of rounds of fixed ammunition had damp fuzes or propellants, defective primers or dented cartridge cases. The cases were reformed and new rounds built up from components. Tight plugs were extracted and the fuze threads of the shell retapped, while broken exploder cavities were repaired with trotyl, for which purpose a melting plant was installed.

This establishment was next duplicated at Blargies to serve the southern line. A particularly valuable piece of work was done on one occasion between these two factories when three-quarters of a million percussion tubes were produced at short notice to meet a critical shortage in supply from home. These were converted from ordinary small arm ammunition by removing the bullet and charge and replacing the latter with gunpowder.

Eventually it was decided to replace both by an even more elaborate central factory at Fressenville in the Somme valley with a staff of 1600, capable of dealing with 300 tons daily, which it was estimated would save a million sterling a month. Work was barely started however, when the German advance in 1918 caused the scheme to be postponed, and Fressenville never functioned except to a very limited extent.

Under the influence of trench warfare the system of ammunition supply at the front was profoundly modified. Mobility ceased to be an essential quality, the prime necessity was to ensure that there was always an abundance close at hand—far more indeed than the horsed echelons of divisional field artillery and the mechanized echelons formed to serve Corps siege artillery could possibly hold on their wheels. Small arm ammunition, grenades, etc., were held in the trenches with further stocks in brigade and divisional reserve. Supplies of artillery ammunition were stacked at gun positions with far larger quantities at divisional refilling points and, for

heavier natures, at similar points (siege parks) intermediate between the railhead and Corps artillery. The road echelons ceased to be permanently under load and, as time went on, were replaced more and more by a network of light railways connecting railheads, dumps and guns.

The railhead itself completely changed its character. It was at first the ordinary countryside station in which lay a train of ammunition ready to advance or retire according to the progress of operations. After the explosion at Audruicq, however, the removal of all stocks of ammunition from the vicinity of villages, main lines and arterial roads was ordered ; and the new railheads were nothing more than transit stations, laid out wherever convenient, to clear ammunition with the utmost despatch. They usually consisted of three to four hundred yards of siding, having a planked roadway on one side where lorries could draw up alongside the trucks, and on the other a narrow gauge line. The stock once held at railhead, with its Ordnance staff, was shifted to one or more main dumps, becoming a reserve at the disposal of the Army Commander available to reinforce any part of his front ; and A.O.C. detachments were posted to railheads only according to the amount of work to be carried out for the time being.

By 1917, when these measures had fully matured, the condition of these large accumulations began to rivet attention. At Army dumps, where there was a trained Ordnance staff, the stock was well cared for and precautions were taken to avoid damage and deterioration. Different descriptions were stored at spaced intervals with sandbag protection, camouflaged and protected from the weather ; flooring was laid, fuzes and propellants grouped, a plentiful supply of water buckets and hand pumps provided ; in short all the arrangements of the base depots were copied as far as possible.

But the state of affairs at Corps dumps (siege parks) where there was no Ordnance staff, was very different. There the ammunition was in charge of an Army Service Corps officer of the siege train who was necessarily ignorant

of such matters. It was useless for the base to sort out cartridges with such meticulous care when they were once more mixed together on arrival at the dump, so that a battery would get a miscellaneous collection all ranging differently. Shell were allowed to get dirty and rusty, deficient of grummets and with their driving bands chipped, factors that tended to increase the rate of wear of the gun. Boxes were left in contact with the ground and exposed to the weather, so that fuzes were spoilt by damp. Fire precautions were conspicuous by their absence. It was common for men to live in the midst of their dump with fires lit for cooking and warmth.¹

To some extent this evil was reflected at the divisional artillery refilling point, the position of which was more governed by the tactical situation, closer to the front and more exposed to the enemy's fire. Apart from this the problem was simpler, the types held being few and gunners in charge. But every artilleryman worth his salt was wanted to work his gun. Boxes would be opened for the issue of their contents, and should these not be wanted they would remain open. Changes in plans of operations or moves of guns would result in the return of many thousands of rounds which would be left lying about, without fuze covers, exposed to the weather and accidental damage. Quantities of boxes would be allowed to accumulate, forming conspicuous and inflammable targets, and the obvious precaution of building the stack at a distance from the live ammunition would be neglected. The boxes were also extensively misappropriated as firewood or to make floorings.

In fact ammunition of immense value to the amount of many thousands of tons, that consumed our manpower in the making and whose sole object was to destroy enemy man-power, was exposed to avoidable risk and rendered substantially less effective because there was no trained staff to look after it.

¹ I once came across a man collecting at a dump remnants of howitzer charges and smoking a pipe with NO SMOKING painted on a notice board over his head. Upon my expostulating he proceeded to empty his pipe among the loose cordite, having not the slightest idea of the danger.

When preparing for the battle of the Somme, extra Ordnance staff was lent to the Armies engaged to help in looking after the large dumps specially formed ; and the same plan was adopted during the operation in the spring of 1917, conducted by the First Army, which resulted in the capture of Vimy Ridge. After this latter operation, which was short and sharp, the Ordnance detachments loaned from the lines of communication were distributed among the Corps of the First Army with a view to straightening out their dumps, sorting out and rearranging the contents and generally putting them in proper fettle ; and the improvements effected were very marked.

The upshot was a decision to form Ordnance Ammunition Units consisting of one officer and eleven men, and give each Corps three of these Units to look after its dumps. The plan was so successful that Corps clamoured for more, and the more open form of warfare that developed in 1918 nipped in the bud a proposal to increase the number from three to five.

The result of this measure was that arrangements in the Army and Corps corresponded with those at G.H.Q. and on the L. of C. That is "Q" dealt with all matters of quantity while the Ordnance supervised storage, issue, receipt and repair. The A.D.O.S. of the Corps was also charged with the duty of seeing that divisional or brigade reserves of small arm ammunition, grenades, bombs and fireworks were properly cared for. These indeed were apt to be the most neglected of all. Grenades, especially, would become unserviceable owing to damp or dangerous from their safety pins rusting, and it needed constant effort to get the division to look after its infantry reserves.¹

¹ Here, for instance, is a report penned by an A.D.O.S. "I well remember visiting a brigade bomb store in Ploegsteert Wood. The front room, which was about 15-feet square, was stacked from floor to ceiling (except for an open space about 8 feet square round the fireplace) with boxes of Mills grenades, Very lights and rockets mixed. The two men in charge were lying on two beds made of boxes of explosives with paillasses of straw on them, the straw being three feet or so from a roaring fire. Each used a box of Mills grenades at the head of his bed as a table

Lectures were also arranged at Army and Corps headquarters or artillery and trench mortar schools where Ordnance officers explained new types of ammunition and how to avoid damage.

The last step in this direction, in the winter of 1917/18, was to give D.A.D.O.S., by now fully conversant with equipment and clothing questions, some training in ammunition by sending him through a course at Blargies or Zeneghem ; and there is no doubt, had the war lasted much longer, that he would have become responsible to his divisional commander for the care of his ammunition on the same footing as the A.D.O.S. in the Corps and D.D.O.S. in the Army.

In spite of all precautions, however, these large stocks could not be held in frontal areas without considerable risk. Before ammunition was removed from railheads, that at Wanquetin was destroyed by a terrible explosion which wrecked the village and caused considerable loss of life, two officers and nine other ranks of the Corps being killed out of a total of twenty-five.¹ Another railhead, the Plateau, in which trucks of ammunition were standing, was destroyed by a direct hit from a bomb dropped on a truck of 8-inch ammunition. But the damage was more commonly due to shell fire, forward dumps being struck and exploded on a number of occasions.

The vagaries of these explosions were very extraordinary and unaccountable. On the one hand can be cited that at Audruicq where heavy lyddite shell were to

and stuck to each box was a guttering candle. There was no water or fire appliance of any sort in the building. One Colonial division became so annoyed by repeated adverse reports on its ammunition dumps and bomb stores that it requested Corps headquarters to instruct me to notify in advance of my proposed inspections, so that a staff officer could be detailed to accompany me. This was done and gave very satisfactory results, as I was able to point out what was wrong to the staff officer ; and within a month all the arrangements were extremely good."

¹ This, it was believed, was due to a shell being prepared with a No. 100 fuze, an operation requiring certain special precautions, and which it was contrary to orders to carry out within the precincts of the dump.

be seen in the largest crater, with pieces gouged out where they had been struck by fragments of others, yet otherwise unharmed although they must have been exposed to intense heat. On the other hand was a strange occurrence at the railhead at Hersin, where an ammunition train was hit by a shell while its contents were being transferred to a dump by light railway. An unfuzed 8-inch shell, hurled from a blazing truck, penetrated the wall of a cottage nearby and exploded inside. Seeing that a fuze with a very powerful gainie or detonator was needed to burst these shell this was very puzzling ; the only explanation that could be offered was that the heat of the burning cordite caused exudation and that the exuded trotyl exploded on striking the wall, conveying the explosion to the interior of the shell in the same manner as a fuze with its gainie would have done. This was one of the occasions when the Ordnance Ammunition Units showed great gallantry. It was the front portion of the train that was struck and the party, working in the midst of the fire, succeeded in uncoupling the remaining trucks and man-handling them to a position of safety, the line being fortunately on a slope.¹

Another result of this strengthening up of the Ordnance staff engaged on ammunition work at the front was that prematures and other accidents were much more closely investigated. Units were instructed to report accidents to Army headquarters, when an officer was sent out to obtain full details of the ammunition and ascertain if there was anything connected with its preparation for action or loading to account for the occurrence. Also, if the gun fell under suspicion on account of exceptional recoil, marked inaccuracy, etc., it would be examined by a workshop officer.

With the progress of the war our frontal areas became littered with derelict ammunition, mainly of our own though partly of enemy origin. Laboratories were formed

¹ For this plucky act Lieutenant Craighead, the Ordnance officer in charge of the party, received the immediate reward of a Military Cross and two men Military Medals.

at central points in forward areas to which this was brought in for examination by certain of the ammunition units, assisted mainly by Chinese labour. Much was in a highly dangerous condition, shell with set fuzes and grenades with detonators fixed, of which immense quantities were picked up and destroyed. Anything capable of being made serviceable by simple hand process was returned to an ammunition dump and the rest sent back to be dealt with on the lines of communication. In the Third Army area, north of the Somme, the scene of so much heavy fighting, the quantity to be dealt with was enormous, and two quite large laboratories were organized by Captain Haigh—'The Ruin' and 'The Wood.'

The normal procedure was for empty packages and brass cartridge cases to be returned to ammunition railheads through the same channels as supplied live rounds. There the course diverged, empties going to Havre and Calais to save delay to ammunition ships. When Zene-ghem was opened, however, served by barge, this objection did not apply; and an area of thirty-three acres were set aside to receive empties for return to England from the northern railheads, Calais being relieved of this work. But though ammunition columns and siege park lorries were supposed to bring back empties when delivering live rounds, in the stress of active operations they had great difficulty in doing so; their time was fully occupied in feeding the guns, especially as they could often only work at night; the result being that a large amount of debris would form and be left behind each time guns changed position.

Of all forms of salvage ammunition was the most important, on account of its bulk, intrinsic value and usefulness to munition factories; especially gun cartridge cases which could be filled over and over again. It was also the most difficult to deal with, fuzed shell, misfired rounds, howitzer cordite charges, bombs and grenades containing their detonators, all of which had to be handled with care, being mixed with empty packages. This miscellany had to be carefully sorted out and each kind dealt with in its appropriate way.

With the numerous blind shell, German and British, with which frontal areas were strewn by the end of the war it was impossible to cope on any extensive scale, although it was realized that they might prove a danger when the soil was once more tilled. Most had buried themselves and, except in rare cases, all that could be done was to post a notice board 'Dud' wherever a blind shell was found, and hope that the effects of the weather would in time render the explosive innocuous. The French several times pressed us to take steps to deal with this danger; but to scour the battlefield systematically and blow up each 'dud' where it lay was impossible; and the French themselves were no more able to cope with the problem during the progress of the war in their areas than we in ours.

CHAPTER VII

THE CAMPAIGN OF 1918

THE elimination of Russia from the war owing to the Bolshevik revolution enabled Germany to set free immense numbers of men and guns and employ forces largely superior to those of France and England combined for operations on the Western Front in 1918.

The great peril to our merchant shipping from submarine warfare was by then being combated with success ; and since practically the entire populace of the nations engaged was employed on war work of some sort, troops and munitions had become interchangeable terms—neither could be got except at the expense of the other. The war, in fact, was more than ever one of attrition, a question of whether the Allies or Continental Powers were first exhausted.

The arrival in any strength of troops from America, whose almost limitless resources must eventually turn the scales in such circumstances, was not expected till the autumn ; and Germany decided to stake everything on a campaign in the interval, hoping to gain such a decisive victory during the summer as would enable her to dictate terms of peace.

Our casualties at Passchendaele in the previous autumn had been immense. Brigades had been reduced from four to three battalions to maintain the full number of cadres, and on every front the British Empire had borne the chief heat and burden of the fighting during the past year. Germany's plan was, with the aid of the troops recalled from Russia who had been living in comparative quiet, to throw the whole weight of her unrivalled military power against the British Armies which were to be rolled back from the south, their contact with the French army severed, and driven shattered to the sea. After this it would be the turn of France to be dealt with.

The movement of troops across the continent throughout the winter could not be kept hid, and it was obvious that Germany would seek to take advantage of her tem-

porary superiority; but beyond this nothing could be foretold with certainty—neither the whereabouts nor the time of an attack which was anticipated with grave anxiety. All that was possible was to make ready resistance along the whole front. Offensive plans were postponed and defences strengthened and deepened.

In the midst of these measures the storm burst on the 21st March on the front of the Fifth Army astride the Somme and that part of the Third immediately on its left. Heralded by a terrific bombardment, wave after wave of selected storm troops and machine gunners advanced to the assault in such overwhelming numbers that the front was quickly penetrated to the alarming depth of several miles. The Fifth Army was driven from its ground south of the Somme and disappeared as a fighting command, while the Third, subjected to almost equal pressure, was obliged to conform to its retirement.

Gradually the initial ferocity of the onslaught spent its force, despite the fresh divisions that Germany poured in. We were able to bring up reserves, the French took over the front south of the Somme, and the battle came to a standstill in front of Amiens, an important strategic railway centre which the enemy was unable to reach.

Meanwhile a subsidiary attack had developed on the 28th March a bit further north, opposite Arras. This was much less successful and was repulsed with little loss of ground.

The first great blow had been struck, and though its intensity caused us to stagger, it had not proved fatal.

The scene next shifted to the front stretching from north of Arras nearly to the coast of Flanders where the line had been thinned by the despatch of troops to reinforce the region of the Somme. Here, on the 9th May, another attack was launched which in the course of the next few days made a deep indentation over a width of some sixty miles.

The situation now seemed critical, so near the coast were we being driven, and the Commander-in-Chief, abandoning his accustomed reserve, issued on the 12th

April a special order in which, after expressing his admiration for the splendid resistance offered, he intimated that there could be no further retirement and that we must fight it out with our backs to the wall.

But the climax of Germany's effort had been reached. Though the blows of the sledge-hammer continued to fall for some time longer, no further impression could be made on the stubborn defence. The line, if dangerously bent, remained unbroken. The flanks held, French troops arrived to assist, and Hazebrouck, another important centre, was saved.

It is no disparagement to the bravery of our men, who were outnumbered three and even four to one, to say that what caused each of these operations in turn to waver and peter out was not because the enemy faltered. Germany had ample reserves opposed to other parts of the front where our line was perilously attenuated by our pouring fresh divisions into the battle. It was rather, as was admitted by Germany, the difficulty of feeding her advancing troops, and in particular that ammunition could not be sent forward fast enough to enable the guns effectively to support their infantry. The area behind the battlefield became blocked. Even at ordinary times it was difficult to prevent traffic congestion, and in the salients created by these attacks, roads and railways had been destroyed by shell fire. Her means of communication were particularly bad during the first operation begun on the 21st March and conducted over ground desolated by previous fighting.

It is not difficult to picture the scene. Stream after stream of German lorries and wagons struggling forward with munitions and rations, guns moving to fresh positions, others being hurried up to replace casualties, among them columns of infantry reliefs wending their way. An equal stream flowing the other way of empty transport, ambulances, disabled guns for repair, infantry returning from the front, wounded and prisoners. All have to pick their way over a wilderness of shell craters; and one lorry disabled through a break in the road or a wagon stuck in the mud suffices to hold up a whole

column. The difficulties were too great even for Germany's organizing genius to overcome immediately.

We on the other hand were all the time falling back over an undevastated country on reserves of materiel; and so long as our main arteries and nerve ganglions were intact, our supply arrangements, though hampered, were not seriously thrown out of gear. While Germany was re-organizing her communications over new frontal areas, repairing roads and laying railways, creating new dumps of food and ammunition, we had breathing space in which to withdraw our artillery to new positions, replace our lost guns, re-form our shattered battalions, re-entrench, bring up fresh troops and face the foe with renewed confidence. The battle then had to start all over again without the one great advantage of the offence—the element of surprise.

Two factors of modern warfare which have been previously mentioned stand out in these encounters. The power of a determined defence to master an equally determined attack in far superior strength, and the extent to which success depends on good administrative staff work.

That Germany lacked neither men nor munitions to continue the struggle is shown by the next events. Having failed to obtain a decision she formed a new plan, a great thrust against the French front at Rheims and Compiègne with Paris as its objective, to be followed by a renewed attempt on the Channel ports.

Here, again, the first onslaughts were dangerously successful. The safety of Paris was imperilled. Very unwillingly a number of British divisions were lent to France, and with a line thus weakened we anxiously awaited further attack. But in reality the Allies were now in better fettle. American troops, fresh and eager for the fray, had been hurried across the Atlantic, all our casualties made good, our big loss of guns replaced, and a French Generalissimo was in supreme command of all the Allies. A brilliant counter-attack in July by massed French reserves threw the foe back over the Marne which he had crossed; and with this failure the

operations which were to follow against our front were abandoned.

This was Germany's final effort, the gambler's last throw which left him bankrupt of resources.

* * * * *

A brief account of these operations, of a magnitude without parallel in the history of the war or indeed of the world, has been necessary to make clear their repercussion on those services with which we are concerned.

At the outbreak of war our army was perfectly mobile, it possessed not an ounce of materiel beyond what its transport could carry. Everything else was well back on the lines of communication and, except for food and ammunition, it was not expected that anything would be necessary whilst actually in contact with the enemy.

So great and incessant, however, did the call for materiel become, especially in warfare of the type that developed in France, that we perhaps went to the opposite extreme and sacrificed mobility overmuch so that the troops might get everything they wanted with a minimum of delay or difficulty. A great array of establishments grew up in frontal areas. Each Ordnance officer with a formation had a substantial dump. Gun parks held large stocks of artillery equipments. Gun workshops occupied ranges of buildings and portable shedding. Ammunition dumps were scattered up and down the country. There were armourers', bootmakers' and other shops, salvage dumps, a host of semi-civil establishments. A few only of these products of the war were supposed to be mobile, but road transport had been largely replaced by light railways. Lorries had been pooled and when wanted for their legitimate purpose were not always forthcoming.

During these battles there was great difficulty in extricating such establishments. At ordinary times the D.D.O.S. of an Army with his expert ammunition and mechanical engineering officers, and the A.D.O.S. of a corps, were as a rule able to get through their office work in the early morning and evening; and spent a

great part of the daylight hours visiting headquarter staffs and departmental institutions to see that everything was up to the mark and working smoothly. But now, with everyone on the move, the temporary officer with a formation, in charge of a workshop, gun park or ammunition dump, was usually deprived of this light and leading, being often cut off from all outside communications. A heavy responsibility rested on his shoulders. He had to take quick decisions with nothing to rely on but his own grit and power of initiative during the most difficult of all military situations—an enforced retirement.

The incubus of an accumulation of materiel to troops in retreat can be judged from the experience of Lieutenant Chaplin, recently posted as D.A.D.O.S. to one of the divisions which suffered such heavy loss on the 27th May while holding what was believed to be a quiet position on the French front near Rheims. After applying in vain to his divisional headquarters, he managed to intercept one lorry. Then two more arrived of which one was ordered away again to carry the instruments of the divisional band. No less than ten lorries were needed to hold the contents of his dump. Four moves, each further to the rear, had to be made under fire in the course of the next 48 hours ; it was impossible to make second journeys, and stores valued at £5000 had to be abandoned. In his diary this officer attributed this loss to his four lorries being used for other services. But though to some extent true this is an overstatement, the loss was caused mainly by the size of the dump.

Others were more fortunate. Lieutenant D. R. Smith, who was with a division in the first battle of March 21st, finding a Flying Corps headquarters next door on fire and guns coming into action alongside, thought it time to evacuate his dump and divisional shops. He managed to remove 16 lorry loads, after which he sent back to destroy the rest to avoid capture by the enemy, for the site was being shelled and swept by machine gun fire from aeroplanes.

The officers' shop made no pretence to mobility ; it was in no sense a fighting organization. That of the

Fifth Army was a total loss; by the time it could be packed up and got to the railway station the last train had left—only half a lorry load was saved. A great part of the overgrown central workshop of this Army was also lost.¹ Elsewhere arrangements were attended with better success; one Army had time to send the heavy plant of its shop to Calais for instance.

In the aggregate these losses were substantial and would have been far more serious had we been driven back only a little further and a little faster.

Medium and light workshops fall into a different category, having important work to do during the progress of battle. But for them there would have been no alternative but to send back every equipment to the lines of communication when out of order; and at a time like this, with batteries on the move and all the ordinary channels of communication more or less disorganized, serious delay would have occurred in replacement. Moreover, the reserve of spare guns required husbanding and could only be used to replace those condemned for wear, entirely disabled or lost to the enemy.

The policy of doing repairs near the front was unquestionably sound, but during a prolonged period of stationary warfare it had perhaps been carried too far. Better work could be done in a semi-permanent workshop than in one on wheels; and, when lorries were pooled, no transport was left beyond what was wanted for daily errands.

The medium workshop in particular, which had the heavier artillery to deal with, had accumulated so much gear that it was apt to be too fully occupied over its own evacuation to attend to current work. Besides this, in the hurry of action, it was difficult to find a site suitable tactically and at the same time capable of accommodating such a large establishment, with solid foundations on which to bed down heavy machinery.

The doings of No. 7 Medium Workshop at Matigny, in charge of Captain Dowling, can be cited by way of

¹ When La Flaque, the site of this shop, was retaken in August, this plant and machinery were recovered intact.

example. Notice to quit was received on the evening of the 21st March, and by working throughout the night the shop was ready to move off at 9 a.m. the next day, with a generous train of eighteen lorries in place of five—the authorized number. Even then a gantry and an assortment of materials had to be left behind. One lorry was dropped at Corps artillery headquarters with a light equipment, a couple more were ditched in shell holes, and during the following days the rest of the column, gathering strength by picking up tractors with parts of heavy artillery and stragglers, wandered from place to place seeking a resting place and finding none. On the 26th Longeau was reached and for the first time some light roadside repairs were carried out; but Longeau was becoming untenable and the same evening the journey was continued to Poix. Here at last a halt could be called and unpacking started, but it was not till the 29th March, after eight valuable days had been lost, that the shop was oncemore in full swing and able to set to work on a large number of siege howitzers and a 6-inch gun that awaited overhaul.

In several cases valuable plant had to be abandoned, Captain Wilson's light shop at Estaires being the most unfortunate. From early dawn on the 9th April shell began to drop and by a series of mischances no transport was available. One lorry was being mended, another collecting stores and rations; even the workshop car was away on duty. A.D.O.S. XVth Corps was told of the situation and then all communication with the outside world ceased. There was nothing to be done but complete the work in hand, get everything ready to move, and stand by. In the afternoon some of our field artillery came into action behind Estaires, the enemy's fire became intense, and in the evening Wilson withdrew his men to greater safety at Vieux Berquin, expecting to return the next morning. Here a message was intercepted from Corps headquarters saying that four lorries would be sent after dark, if circumstances permitted, to evacuate the workshop. The lorries failed to arrive and the next day Estaires was in the hands of the Germans.

Wilson took the loss of his shop greatly to heart, but there was nothing more he could have done. To have stayed longer would only have led to loss of personnel besides materiel. As it was, he and his assistants were able to help another shop suffering from pressure of work.

That frontal workshops helped substantially to save the situation, and that their staff did wonderfully good work, is beyond question¹; but these instances go to show that their services would have been even more valuable had their original mobility been restored during the winter when we were preparing to be attacked. The workshop should have been able to function without having to entirely dismantle and re-erect its machinery. Whether in advance or retreat its mobility was assuredly no less important than that of the guns it served.

In the work of making good artillery casualties, gun

¹ The case is well put in the following kindly letter from G.O.C. R.A. to A.D.O.S. Vth Corps :

DEAR BLACKBURN,

I have been wanting for long to get an opportunity of going round your workshops and telling the officers and men how much I appreciate the untiring zeal with which they worked to refit our guns during the recent battle.

Without their work—which was as valuable as that of those who were using the guns—we could not have got on, and I often think that it is the unshowy work which carries no excitement and receives few rewards, which is the hardest to perform.

I still hope to come round at an early date, but I should be much obliged if you would convey my gratitude and appreciation to all concerned.

Yours sincerely,

R. P. BENSON.

29th April, 1918.

Several instances of gallantry were specially rewarded, among which the plucky conduct of Staff-Sergeant Gascoyne, serving as an armament artificer with an artillery brigade, who received an immediate award of the Distinguished Conduct Medal may be cited. The record reads :

“After the infantry had retired through a battery and the enemy were 600 yards away, he personally disabled one of the guns and then joined a party of infantry whose officer was soon after killed. Taking charge of the party and being forced to retire, he successfully withdrew to a line of defence where he remained in charge till sufficient reinforcements arrived to counter-attack. After the guns were retaken he remained with them till tractors arrived to salve them.”

parks took an equal share. Our loss of guns to the enemy was very severe and there was never any difficulty in evacuating a gun park, so quickly did it empty itself. The difficulty was to keep it replenished.¹

The doings of the Fifth Army park at La Flaque have been recorded by Captain Gay, the officer in charge. At the outset there was such a heavy demand for guns of all calibres and their fittings that it looked as if the stock would run dry. But a train of sixty trucks opportunely arrived, and though gunners came and gunners went, none departed empty handed. "A 2/Lieutenant of the R.F.A. went away the proud possessor of four packets of cigarettes and a gun, saying he would be the most popular man in the battery—because of the woodbines."

On the 26th March the stream of guns passing back along the road ceased and artillery was now in action to the rear. The remains of the park were therefore withdrawn to Longeau, only a few stores of little value being left behind. Shell were falling dangerously near as the last lorry moved off and our machine gunners were taking up positions covering the road.

Another section of the park had been opened at Longeau two days earlier, and on the 27th a further move had to be made to Poix. But work continued at one place or the other without intermission by day or night; one

¹ Gun casualties between the 20th March and the end of April 1918 are set forth in the following table:

Nature.	Shell fire.	Premature	Wear.	Lost.	Total.
13-pounder Q.F.	5	—	2	4	11
13-pounder A.A.	3	—	24	4	31
3-inch 20 cwt.	—	—	17	—	17
18-pounder	289	16	100	411	816
60-pounder	41	16	60	44	161
6-inch	1	2	12	9	24
12-inch	—	—	1	—	1
4.5-inch howitzer	86	15	65	114	280
6-inch howitzer	56	7	16	118	197
8-inch howitzer	10	—	2	32	44
9.2-inch howitzer	2	—	3	29	34
12-inch howitzer	—	—	—	5	5

train after another arrived, and as fast as guns and carriages were off-loaded they were assembled, fitted with adjuncts and handed over to waiting gunners. The only misfortunes were that a direct hit from an aeroplane bomb put eleven field guns out of action, and that another killed six men and wounded twenty-five others, the park having become a nucleus for numerous stragglers whose wants it was able to relieve.

When finally it came to rest at Pont Remy on the 9th May (Poix being in the area taken over by the French), it had issued no less than 585 guns and 2941 machine guns.

In no case did a gun park sustain any loss worth mention. Their movements were excellently timed. In the Third Army an advanced section at Bapaume had been withdrawn shortly before the offensive ; and in the First Army portions of the stock were even pushed forward during the attack to lie within easier reach of the gunners. During these critical days, and with communications so strained, these institutions proved invaluable.¹ It should be added that the elaborate arrangements by which casualties were only to be made good from a gun park after getting sanction from G.H.Q. went to the winds once the real pinch was felt.

The arrangements for supplying ammunition and the enormous stocks held in frontal areas after three years of stationary conflict have been described in the last chapter. The amount expended was so weighty and so fluctuating both as to time and place, that in no other way could the Gargantuan appetite of trench warfare be satisfied ; and although the result was that no ammunition was mobile except what happened to be on the move from day to day, the risk of loss was slight so long as we could be tolerably sure of holding our positions.

¹ The following is an extract from the report of the 1st Corps in the First Army on the operations :

Replacements of guns and carriages—The arrangements made for immediate replacement were most satisfactory. Gun park stocks were always ready to meet demands, and did not fail on any occasion. The close liaison between Ordnance and Royal Artillery throughout the whole period was the secret of success in replacement.

During these battles, where we lost so many guns, the ammunition remaining in their dug-outs disappeared with them, the more forward dumps and re-filling points went next, supply through the accustomed echelons and channels broke down, and the railheads and dumps in charge of the A.O.C. became pivots on which the guns rallied and drew what they needed.

Officers in command of Ordnance ammunition units had orders to stay at their posts till the last possible moment and, before leaving, either themselves to destroy what had to be abandoned, or to arrange that this was done by the R.E. whose business it was to demolish bridges, etc., in a retreat. The responsibility resting on these junior officers was particularly heavy. Their highly dangerous freighting was a special target for enemy planes and guns, and as a rule they had only their own judgment to rely on. Two illustrations will show the nature of the work and how they acquitted themselves.

Captain Banfield, with two units, was at X.U. rail-head¹ in the Fifth Army when the first bombardment started, and almost at once the railway approach was cut by shell fire concentrated on the post. Two trains which had arrived the day before were on the sidings and later on some 13-pdr. ammunition was received by road. The time was spent in unloading, unboxing and issuing field gun ammunition, and so heavy were the demands that, when the bombardment was resumed the next morning and a direct hit made on a shed, the 6000 rounds it had contained a few hours previously had all gone. "The hangar was now empty and Fritz drew a blank."

The Labour Company had been withdrawn owing to casualties, and at 11 a.m. on the 22nd March, as there was little doing and the fire was intense, Banfield sent back his men, remaining in a dug-out and meeting a few more demands from passing horse artillery and infantry entrenched behind the station, who were short of ammunition for their rifles and machine guns.

At 4 p.m., as demands had ceased and the place was

¹ These sidings, built during the war, had no names on the map of France.

by then under rifle fire, he decided it was time to quit and rejoined his party at 'Misery,' the next railhead in rear where the line was still open, and where a train, unable to get further forward, was found waiting. Misery was on the point of being evacuated, but there was just time to remove some of the field gun ammunition before the train was withdrawn by the R.T.O., which enabled more guns passing by to be replenished, the detachment taking cover from shrapnel in a ditch during slack intervals.

The same night, there being no more guns in the vicinity, the march was continued to Chaulnes, where it was hoped to find the train from Misery. Chaulnes, however, was deserted, no news could be got of the whereabouts of this or any other consignment of ammunition, and after a rest the journey was resumed to La Flaque which was reached on the 24th, and where it was possible to get into touch with headquarters.

So far the small Ordnance detachment had been lucky, but here it sustained a heavy loss, its strength being reduced by half by a single bomb. Among the wounded was Captain Banfield¹ who, however, was able to remain on duty and, acting under instructions, took the rest of the detachment on to continue work first at 'X.T.' and next at Petit Blangy. On the 28th they proceeded to Montières which continued in use as an ammunition railhead for some time. The enemy was using long range gun fire on this spot, and during the night of the 14th April obtained five direct hits, but fortunately all ammunition received during the day had been cleared a few hours earlier, "so Fritz again drew a blank." Two days later another move was made to Bois du Gard.

This account is typical of a number of others. Ordnance ammunition units had to stay at their railheads long after they were abandoned as such. They stayed till all calls for ammunition had ceased, till not only the guns but often the infantry had passed back; only then could they retire to the next railhead. All the time trains

¹ This officer was one of those who received an award in the Field of the M.C. for his services.

were being sent forward as far as it was safe for them to go. Sometimes these only arrived to be promptly withdrawn, but even so there was time during shunting operations to throw overboard some part of the contents.

Rarely was there any superfluity of field gun ammunition at a railhead, every round was badly wanted—one detachment alone exhausted the whole of what it possessed at the moment in two days, 87,000 rounds of 18-pdr. and 22,500 of 4.5-inch howitzer; but there was often more of the heavier natures than was called for. Then, before finally quitting the post, if there seemed no prospect of its re-occupation, cartridges, tubes and fuzes would be fired, and only the bare shell, useless to an enemy by themselves, abandoned.

The next case illustrates the work of an ammunition dump. At 'Trent,' a large reserve, several stacks of ammunition were exploded by shell fire on the afternoon of the 9th April. For five hours the fires had to be battled with to prevent the whole place from going up in flames, Captain Gee who arrived from Army headquarters taking a prominent part in this dangerous work.¹

"During the afternoon of the next day," writes Captain Alaway, who was in charge, "it became apparent from the heavy traffic retiring towards Bailleul that something untowards was happening, and this was confirmed by explosions at O.X.D. three kilometres away towards Armentières. I therefore detailed my party who were to destroy the dumps to be in readiness. At about 2.30 p.m. the Commander of B/121 Brigade, R.F.A. galloped in and enquired if any 18-pounder or 4.5-inch ammunition was available and the quantity. I informed him that far more was available than would meet his immediate requirements. Shortly after this a number of limbers pulled into the depot and refilled. At 3 p.m. some field batteries took up positions at the far end of the depot and immediately went into action. At 5 p.m.

¹ Captain Gee, an ex-Master Gunner, was given a commission in the Ordnance early in the war as an ammunition officer. He was one of the few who gained the rare distinction of having an M.C. with two bars, each awarded for some act of gallantry.

the R.E. destroyed the railway opposite. At about 7.30 p.m. the crisis passed and my party, who had remained in readiness the whole time to fire the depot, was dismissed.

"During all this time, heavy issues of ammunition proceeded which continued at frequent intervals throughout the night; and several gunner officers expressed the opinion that Trent saved the situation as far as they were concerned.

"Meanwhile steps were being taken to evacuate as much as possible until finally, at 3 p.m. on the 11th, an officer of the railway operating staff arrived with an engine and announced that it was imperative that he should at once pull out all rolling stock as it was doubtful if he could get past Merris, towards which the enemy had been attacking heavily all day. As he did not return, I presume he got through.

"At 3.30 p.m. the field batteries pulled out and retired to positions some distance to the rear, where they at once resumed action. Heavy demands continued for 18-pounder, 4.5-inch, 60-pounder and 6-inch howitzer ammunition without break until 6 a.m. on the 12th April, when the last demand for 60-pounder was satisfied. Between sun-set and sun-rise the work was carried out under great difficulties, owing to the darkness, the distance the ammunition had to be carried (in some cases a quarter of a mile) as lorries could not get nearer to the depot than the main road, and the heavy hostile shelling which continued the whole time.¹

"At 8.15 a.m. on the 12th April, our infantry established a line of out-posts through the depot and dug in, and at about 11 a.m. the hostile shelling increased.

"I now considered it advisable to evacuate the camp and at 11.35 a.m., with the exception of a picked party retained for firing the dump, I paraded all ranks and marched them off to a pre-arranged rendezvous. At 11.55 a.m. a heavy barrage was directed on the infantry dug in across the depot, and almost immediately the shed containing trench munitions blew up. Following this

¹ It had never been anticipated that these reserves would be called on to make direct issue. They were planned to work by rail—broad or narrow gauge.

a cartridge shed caught fire and rapidly became one huge sheet of flame. Between 12 noon and 12.30 p.m. the position taken up by the infantry became untenable owing to the barrage and firing of dumps and they gradually retired.

"At 12.35 p.m., with the infantry well to our rear and the depot one mass of flame, I decided to fire the camp (that being practically all that now remained), and this was effectually done with No. 27 grenades. The office was burnt to the ground and all papers destroyed.

"At 12.45 p.m., those remaining—Lieut. Woodhead, A.O.C., Sub-Cond. H. J. Beckett, Pte. F. J. Cross, A.O.C. and myself—moved off and joined the main party at the rendezvous.

"It is of interest to note that the last issues of ammunition, consisting of 360 rounds of 18-pdr. H.E., and 152 rounds of 18-pdr. shrapnel to B/121 Brigade, and 213 rounds of 18-pdr. H.E., and 91 rounds 18-pdr. shrapnel to C/121 Brigade were made after 11 a.m.; thus issues went on to almost within an hour of the final evacuation to batteries in action at our rear.

"I desire to put on record the excellent work done during the last 72 hours at Trent by all ranks. Every man in the camp, without exception, the labour party, cooks, batmen and sanitary men, worked with a goodwill, loading ammunition under practically continuous fire; otherwise the demands could never have been satisfied.¹"

Bearing in mind the supreme need that there should be no shortage of ammunition at such a crisis and the way in which these dumps were able to provide what was wanted when every other source of supply failed, criticism may seem invidious.

It is however possible to argue that for a defensive action, where it was important that a retirement should

¹ The safe arrival of the main party sent off in the morning was reported by an officer of the Hampshire Regiment who added, "I must congratulate you on the very excellent work you have done—your masterly retreat and the safety of all concerned which I have heard all about."

Captain Alway received the M.C., Conductor Beckett the Distinguished Conduct Medal and Private Cross the Military Medal.

not be hampered, our reserves near the front were too lavish. They were imperilled immediately, and it was only by strenuous exertions that some part of their contents was evacuated. The trains engaged in the removal of surplus stocks might have been more profitably employed in bringing forward ammunition to some other point where it was wanted.

In support of this view one more example will be cited, that of a dump at Vieux Berquin in the First Army, intended to hold 5000 tons, which was actually in process of formation when the battle started. Not being complete, it only held 2850 tons, of which 1000 were issued to artillery and 1220 evacuated by rail. Most of the balance had to be abandoned intact, as to blow it up would have endangered our own troops. Had this dump been fully stocked the loss would have amounted to 3780 tons. Even as it was it held nearly three times as much as was needed.

In all, the stocks in army areas, of which substantial quantities were lost, were in the neighbourhood of 100,000 tons of a value of some two million sterling, and ships, steel, coal, a host of other ingredients and machinery, besides man power—all very precious at the time—were required to remake every round wasted.

Further, the danger that the enemy might turn against ourselves the guns he captured could not be ignored, although this never happened. Much time and labour would have been needed before strange guns temporarily disabled and munitions in shreds and patches could be brought into service by a foe.

There are however cogent arguments on the other side. It was impossible to estimate with anything approaching precision the amount and nature of ammunition likely to be wanted in any locality, and far better to have too much than too little. Had the retreat been less hasty the dumps might have had much heavier calls to meet. One reason why so much was held in army areas was the difficulty of finding room for the vast amount stored overseas. The quantities held in these dumps were small compared with the stocks in the big depots in rear, which were liable to destruction by air-raid. The permanent way might be

damaged. In short it was better to scatter some of the eggs in place of holding them all in a few large baskets.

The most that can be said is that the margin of safety provided by these dumps was probably over-great for a defensive action which was much more likely to result in retreat than advance.

Reviewing all these matters one cannot help feeling that it would have been well had more active steps been taken to reduce or render more mobile all non-combatant organizations in frontal areas during the preceding winter, when it was fully anticipated that an attack in strength was to be expected. While we could be so confident of holding our ground that risk of loss was slight, it was right and proper to instal near the front any institution that added to efficiency or economy. But our High Command knew what a vast array Germany was gathering together and that the spring and summer of 1918 would be a most anxious and critical period.

There would have been ample time during the winter to reduce the Ordnance officer's dump to more manageable proportions capable of being carried on his lorries. With such a stormy forecast, officers' shops in Army areas might have been dispensed with—we had managed without them for the first two years of the war. Gun workshops might have evacuated their heavier gear to the base until the weather cleared ; and ammunition dumps have been reduced in size, especially as regards the heavier natures of artillery of which much less use could be made as soon as movement developed.

These remarks apply in particular to those organizations built up to buttress economy rather than efficiency and which it was a penny wise and pound foolish policy to expose to undue risk. There was a great accumulation of salvage and perhaps too much was attempted in the way of overhaul and repair. At such a time it would have been preferable to bundle everything back to the base that was not obviously worthless.

This criticism however does not imply that we should have reverted to the state of affairs prevailing at the

outbreak of war when no cut and dried plan existed for maintaining the troops with equipment while in contact with the enemy. The point is that we had gone from one extreme to the other. The fact is, I think, that everyone had become so inured to a stationary state of warfare that it was difficult to conceive of other conditions. Commanders, far from trying to reduce, were usually eager to expand any organization helpful in supply or salvage ; and the Ordnance officer, with his more limited outlook, was naturally keen to assist. That Germany might succeed where we had failed during the past two years was difficult to realize.

Germany's attempt did fail and our loss of materiel, though immense, was quickly made good. But this should not blind our eyes to the fact that Germany very nearly did succeed, when our losses would have been infinitely more severe. We might even have been reduced to holding the Channel ports with grim death staring us in the face or, abandoning them, retreat to the south to keep in touch with the French and prevent each ally from being dealt with piecemeal. These alternatives had to be seriously faced when matters were at their worst.

Turning next to the zone in rear. The first fear was that Amiens might be lost, our southern line of communications cut and our establishments south of the Somme isolated. Shipments of stores and clothing to Havre and Rouen were at once reduced by 60 per cent and those to Calais increased in proportion. The evacuation to Etaples of the depot at Abbeville was started and work suspended at the new gun and ammunition repair factories set up at Criel and Fressenville.

Schemes were secretly prepared for the demolition, if need be within twenty-four hours, of the three main ammunition depots in this area. To render shell and bombs useless by firing their components was comparatively easy ; the great danger was that our field gun ammunition—where shell, fuze, charge and igniter were combined in one unit—would fall into the enemy's hands. To blow up enormous solid stacks of fixed ammunition

would endanger life and property in the neighbourhood. At Saigneville and Rouxmesnil there were waterways nearby in which ammunition could be drowned or by which some portion might possibly be taken by barge, for rail transport was not to be relied on in such an emergency; but this was not the case at Blargies, the most exposed of the three. The enemy penetrated to within twenty-eight miles of this depot, and some of our batteries actually arrived there to draw ammunition direct. The French had a big ammunition depot not far off and there were other large British establishments in the vicinity. The most that could be done was to scatter portions of the fixed ammunition among the most isolated areas to reduce the extent of individual explosions.

Should the zone south of the Somme be isolated the intention was to entrust its defence to G.O.C. lines of communication area; to leave at Havre and Rouen a modicum of stores and clothing for current use, and ship the balance to Calais which would be called on to supply all the troops in forward areas.

While these plans were being elaborated and perfected, our front was breached further to the north. It was now the Channel ports that were jeopardised; the original programme of shipments, half to Havre and half to Calais was resumed, and an old scheme for the evacuation of Calais, framed in 1915 before it had been deemed amply secure, unearthed and brought up-to-date. To avoid the possibility of such a disaster as the loss of all our artillery reserves, the whole of which it will be remembered were at Calais, half the stock was sent by rail to Havre. At the same time arrangements were made to cut down the ammunition at Zeneghem and Audruicq, the most exposed depots in this region, by issuing from them in preference to other depots.

Retreat in the northern zone was a more serious matter than in the south, as our line of communications was there so short. With but little more loss of territory Calais and Boulogne, though still tenable, would have come under long range gun fire, in which case their activities would have to be curtailed. Probably all the

civilians would have quit, as did those at Etaples when raided by aeroplanes. Le Treport was suggested as a site for a main store depot and work was begun on a new ammunition depot at Conteville, to be fed from Dieppe.

These measures, however, were only palliatives. It was decided at all costs not to sever contact with the French, and this might involve the abandonment of the Channel ports. We might even have to give up those on the Seine and fall back on the Loire once more.

It was now realized that the policy of concentrating so many services overseas held a great danger. The process had been a natural one. If guns and wagons could be rebuilt in the country why send them to England? If clothing could be renovated by cheap female labour in France why ship it home, where labour was so scarce, to be cleaned and mended? Then followed the havoc wrought on our mercantile marine by German submarines and the policy was extended to its utmost limits. With each succeeding year more and more services were carried out on French soil where, moreover, the network of operations continually extended towards the front as rail transport was also scarce.

Besides what was wanted from day to day, there were by this time gigantic accumulations of dead stock at Havre, Calais, Paris and elsewhere—millions of articles of winter clothing, thousands of repairable wagons, masses of salvaged goods of every sort, gun cartridge cases and munition packages by the ten thousand ton waiting to be fetched at a convenient opportunity. The War Office at this juncture was repeatedly pressed to relieve the army in France of this immense liability, but every depot at home was replete, every ship occupied, and nothing could be done.

Providentially we were never reduced to the extremity of having to give up Calais, compared with which the hurried evacuation of Havre in September 1914 would have been child's play. Had we been forced to retreat to the south, nothing beyond a very small fraction of the most valuable military stores and small emergency reserves of ammunition could possibly have been saved.

Only at Paris were any steps actually taken. In July, half a million blankets were ordered home and it was proposed that the washing and storing of winter clothing be done in England. Paris was saved and this is as far as matters went.

Actually our communications, although strained, were never interrupted. The way in which our huge loss of guns was made good from England was a marvel. Munition workers, recently restrained from striking only by the threat of being conscripted, even volunteered to forego their Easter holiday. The only limit to the rate at which materiel was sent to France was the rate at which it could be absorbed. Refitment of the troops that bore the brunt of the first attack was far the biggest operation of its sort in the war. Divisions as they were withdrawn were concentrated round Abbeville to be re-equipped, while with Poix as a centre 20,000 gunners were furnished with all they needed. Elsewhere the ordinary arrangements sufficed.¹

¹ The following is an extract from the 1st Corps report on the operations:

Ordnance Supply generally—In spite of constant movements of divisions in and out of the Corps, and constant need of refitting those coming in and out of the line, there was no hitch in supply, and no arrangements had to be made out of routine, which speaks well for the system.

A few statistics will show how immense were our losses and how speedily they were made good :—

Item.	Number issued.		Increase. over normal.
	1/2 to 25/2/18.	25/3 to 18/4/18.	
Rifles	17,776	63,935	46,159
Packs	21,516	147,903	126,387
Tents	3,985	36,546	32,561
Blankets	145,980	631,557	485,577
Stretchers	1,259	29,523	28,264
Binoculars	1,656	10,129	8,473
Dial Sights	2,939	8,639	5,700
Limbered Wagons	110	537	427
Bicycles	1,571	4,804	3,233
Telephones	912	3,338	2,426
Telephone Cable (Miles)	6,708	23,027	16,319
Boots	279,735	442,386	162,651
Box Respirators	135,497	362,402	226,905

The hurried arrival of troops from the United States in single battalions, to be incorporated in and trained with our divisions, added to all this work. They had to be furnished with our rifles and ammunition, machine guns, trench mortars, respirators, steel helmets, etc., which had later to be withdrawn when they joined their own Army. When their artillery arrived large numbers of complete siege equipments had to be assembled for their use. These transactions were complicated not only by financial adjustments and difficulties of nomenclature, but because their organization differed from ours—the duties covered by our Ordnance being spread over several branches; their Ordnance taking part of the work, their Quartermaster's Department another part, and their Signal, Engineering and Medical services yet others¹.

During all this time enemy aeroplanes made determined efforts to interfere with the work of supply. Calais was several times raided though only slightly damaged, and Havre alone escaped scot free. The chief targets were naturally the ammunition depots. These were full to overflowing, and safety spaces had been encroached on; but so well dispersed and protected were the stocks that only twice was any material damage done.

On the night of 19/20th May an organized attack by German aeroplanes under the command of the celebrated 'Ace' Richthoven, was made on Blargies. About 120 bombs were dropped on the depot itself but little damage was done, as on this night the planes were well

¹ To help in keeping matters straight, for we continued to assist in equipping the American army, an Ordnance officer was attached to the headquarters of the American Expeditionary Force, who had occasion several times to comment on the unfortunate results of this division of labour. "Consolidation of demands of the various branches," he reports, "is badly needed. I understand that the question is being considered of making each branch responsible for the total provision of one class of store. At present each provides for its own requirements without reference to stocks which may be available with other branches. As a case in point, the Signal service were urgently in need of hand axes and asked if we could help. I went to the Ordnance branch and found that they had sufficient stock to tide over the immediate urgency." This, of course, is just what happened with us at the Crimea under a similar organization.

up. The same squadron returned the night following and was more successful, this being the only raid, except that at Audriucq in 1916, which put a depot temporarily out of action.

In his report, Major Hopkins says that a shed full of 8-inch and 9.2-inch cartridges was immediately struck and its contents destroyed. Other bombs quickly took effect and soon the depot was blazing in five different directions. Low flying planes used their machine guns to make it more difficult to cope with the incendiary fires. "Work is proceeding to-day, the 22nd, on clearing the railway lines, so that the remaining stocks may be available for issue as soon as possible. It is hoped that this work will be completed in two or three days' time. The railway lines are destroyed in numerous places, but traffic in the main depot was down as low as possible and no great amount of rolling stock was destroyed—at most fifty trucks and perhaps two locomotives. All loading orders had been completed and despatched except one train, half of which was saved by being run into an extension. All incoming traffic was also saved by removal to this area." 5000 tons of ammunition and a number of lives were lost; the casualties being mainly among those of the A.O.C. whose duty it was to fight the fires.¹

Marshal Foch, the new Allied Generalissimo, had his headquarters at Molières village about four miles from Blargies. He sent to ask that the depot be moved the following day or as soon as possible. It had to be pointed out that it would take some little time to move the many thousands of tons of ammunition, besides the 16,000 tons of their own ammunition which the French had asked us to hold. The matter was left at that and the depot was not moved.

¹ The following awards were made to the Ordnance staff :

Capt. Bailey—M.C.
Lt. Corbett Sullivan—M.C.
Lt. Johnson—Bar to M.C.
Sub-Conductor Harris—D.C.M.
Sub-Conductor Bancroft—M.M.
Staff Sergeant Jasper—M.M.

On the night of May 21/22 Saigneville was attacked by the same squadron, but, in spite of an all-night bombing, six sheds only were struck out of a total of fifty-two. This was due to the fact that Saigneville was laid out as a modern ammunition depot, and in consequence was able to report 'business as usual' next day.

Altogether these few months were crammed with instructive incidents for the Ordnance officer. Previous chapters have shown how means of replenishing equipment on active service had been neglected in peace, how this neglect was remedied, and what a specially predominant rôle was taken by materiel in trench warfare. Here, by way of contrast, we see how an army can become so encumbered that its free movement may be hampered. Non-combatant organizations near the front became a drag in retreat. Germany's advance, on the other hand, was delayed by the difficulty in bringing forward supplies. But for this our further movements might have been far more gravely hindered by the presence of immensely greater institutions more to the rear, many of which might have been located in England but for shortage of sea transport. It is also worth noting that it was Germany's unwillingness to sacrifice the huge depots and other institutions she had created on French soil which caused her to give ground with such leaden feet in the months to come. But for these, a far sounder military policy would have been to retire in good order, as she could have done, to a much shorter front where the Allies might again have been held at bay.

In future wars between great industrial nations, should such unhappily occur, it seems evident that mechanical appliances will play an even greater part, and the clash between the rival claims of *Mobility* and *Materiel* will be even more pronounced.

The instinct of every Ordnance officer worth his salt will be to expand whatever organization may be in his care, to make everything as easy as possible for the troops he serves and transfer no work to those behind him that he can himself carry out. To curb this inclination and

see that it is not carried to excess will be very difficult, for it is on his shoulders that the blame will fall if anything be found wanting. Nevertheless it will be just as much his duty to tender advice when he considers some service should be relegated to a point further in rear in the interests of mobility, as when he believes some other should be shifted further forward in the interests of efficiency. As an administrative officer it will be his business to cultivate a wide view ; for how to preserve a happy mean during the ebb and flow of warfare will need judgment of a high order.

The remaining months of the war can be dismissed much more briefly. The events described above were loudly proclaimed by Germany as great victories and accepted by the Allies as defeats. Viewed in a more sober light it can be seen that Germany had defeated herself.

In the attack more lives may be expected to be lost than in the defence, what is hoped is that this loss will be far more than recouped later. Germany's casualties had been heavy, and by selecting specially trusted troops for storming parties she must have immolated her finest and most patriotic manhood. The populace had been fed on exaggerated and lying propaganda and when it found these 'victories' were barren of result it at last revolted. In the Navy, which had no great tradition to sustain it and which had been shut up all through the war in its harbours, there were mutinies. Even the high tradition of the Army was not proof against insidious attack from the homeland ; men refused to obey their officers or to return from leave. The crumbling of the military edifice that was the mainstay of German monarchical government was hastened from outside. Turkey was routed in Palestine and Syria ; Bulgaria, realizing too late that it had backed the wrong horse, sued for peace ; Austria, driven from Italian soil, was tottering. The German Emperor abdicated and fled. A provisional government was formed which sued for peace, and on the 11th November, 1918, an Armistice was signed under

the terms of which Germany was compelled by dire necessity to submit to every condition imposed by the Allies.

But though deliverance came so quickly in the end there was still very severe fighting ahead. The tide finally turned on the 8th August when we bit back deeply into the German salient created in front of Amiens in the spring. In this battle there was no prolonged artillery bombardment such as usually heralded the infantry assault, but which enabled the foe to prepare for attack and gave him time to hurry reserves to the point threatened. Large numbers of Tanks were used instead to lead the advance and cover the infantry. The method proved a complete success. The enemy was taken by surprise and lost heavily. Fighting then spread from one extremity of the line to the other, but every inch of ground was stubbornly contested and only gradually did the warfare become one of movement. When this happened Ordnance services at the front were forced to adopt a strict regimen of mobility. All the more immobile institutions such as dumps and heavy workshops were left behind, and as the resistance became less determined it was increasingly difficult for supply to keep pace with advance.

Though new railheads were opened as quickly as the permanent way could be rebuilt, troops were at one time 70 miles in advance of the railway. Relays of motor convoys were employed, there was delay in bringing forward equipment and clothing to which we had grown unaccustomed and many petty losses occurred *en route*. There was no option but to put up with this inconvenience; but for the actual fighting, gun parks and mobile workshops were still indispensable. The former were divided into two or even more echelons which moved forward in turn; while the latter, stripped of their heavier impedimenta, usually worked in pairs—each in rotation taking up a position in front of the other. In this way movements were reduced by half and transport was used to double advantage. Once again ammunition supply was liquefied, the stock in rear of the road echelons

being kept in railway trains which moved forward as the railhead advanced.

The clearance of the vast battle-field area really belongs to the post-Armistice period, though the work was started during the advance, dumps of abandoned ammunition, British and German, being formed, and parks of captured enemy guns. One of these parks, which held 600 pieces of every known calibre, was a celebrity visited both by our own and the French Commander-in-Chief.

At the end of May 1918 Sir Harold Parsons, who had been ordered home to take up the post of Director at the War Office¹, was relieved by Major-General Sir Charles Mathew, an extract from whose diary may fittingly bring this chapter to a close. "28th November, 1918. Dined with the Commander-in-Chief to meet His Majesty the King, who informed me of the honour He was doing the Corps by conferring on it the title of Royal, in recognition of its excellent work."

¹ General Parsons' farewell order of the 31st May reads as follows :

After holding the position of Director of Ordnance Services of the British Armies in France since October 1914, I am leaving to take up an appointment at the War Office.

Before doing so, I wish to express my grateful thanks to officers and all other ranks of the Ordnance in France for the unfailing support they have at all times given me, and for their loyalty and devotion to duty.

The work of the Department in supplying the wants of our Armies has been strenuous to a degree, and it has only been carried out with such signal success by the entire absence of friction and through the willing and cordial cooperation of all ranks.

Our duties do not normally take us into the danger zone of the front line, but whenever opportunities have offered of showing courage and devotion to duty under fire, they have been readily taken, as the following figures will show : 22 Officers and 60 other ranks have, in the Western Theatre of War, received "Immediate Awards" of Honours for gallantry in the field.

In again expressing my thanks, I specially wish to include all ranks of the Ordnance Corps of our Overseas Forces and also the Q.M.A.A.C. who are now employed with the Department in large numbers and doing such valuable work.

CHAPTER VIII

DEMobilIZATION

IN one sense it was far more difficult to stop the war than it had been to set it going. The Armies of the Empire were created gradually, and the machinery for their maintenance was built up with them piece by piece, until eventually it developed into a world-wide organization and absorbed every field of human activity. During more than four years the titanic war machine had been gathering momentum. Now, on a sudden, its movement had not only to be arrested but reversed ; and the strain imposed by the application of the brake and throwing into gear of the reverse lever aggravated very substantially those gaping wounds left by the Great War on the surface of the earth, whose scars are still so plainly visible. The whole productive energy of the world had been gradually diverted from its wonted courses, and the attempt to restore it with all speed to normal channels gave rise to intensely difficult problems ; and in no case more so than in highly industrialized Great Britain.

Long before the Armistice a Committee had assembled in London to consider how best to carry out demobilization ; and it was this paramount importance of setting our peace industries going once more and finding employment for millions of demobilized men that dominated the situation.

The plan adopted was first to set free those necessary to restart each branch of peaceful industry—pivotal men they were called. The process was next to be extended to others, according to their vocations or guarantees of employment, at such rate as they could be absorbed by the labour market. But in those administrative Corps on whom would now fall the brunt of the military work—that of clearing up the aftermath of war—no one was to be released unless he were an essential pivotal man ; and, as this work would fall with the greatest severity on the Ordnance, those of the R.A.O.C. would of necessity be the last to be set free.

Each man was to go home with a full kit ; and, after handing in his arms and accoutrements at a dispersal camp, could rejoin civil life in his service uniform and military boots, with a complete set of underclothes and other necessities. By this process of attrition each unit would be gradually reduced to a cadre, which was to retain its regimental equipment to the accustomed scale. Everything extra, specially authorized owing to special conditions, was to be returned to the Ordnance locally, and anything deficient or not up to the mark made good from local stocks. The complete mobilization equipment was then to be examined and verified by an Ordnance officer and listed, though no ledger account was to be opened. Finally, when the cadre returned home, it was to be accompanied by this equipment which would either be retained, should the unit form part of our post-war army, or returned to some Ordnance depot at home ; the list already prepared serving in either case as the basis of a peace equipment account.

Excellent in theory, the plan unfortunately ignored two very vital considerations, human nature and the fact that eight months were to elapse between the signing of an armistice and the conclusion of peace. True, as time went on and it became clear that Germany could not continue the struggle, the armistice period merged more and more into a peace period ; but nevertheless we had to be prepared at any time to resume hostilities until terms of peace were actually accepted by the enemy. This necessity conflicted with the spirit of the scheme, which aimed at getting the wheels of industry going as quickly as possible and setting everyone free with a minimum of delay and hardship.

For the rank and file the war had ended on the 11th November, 1918. They had joined up for the duration of the war and it was in vain that the meaning of an armistice was defined in orders and explained in lectures or informal talks by officers to their men. Convinced against their will, they were of the same opinion still and could not understand why they were compelled to mark time.

An even more powerful reason for the spirit of unrest that pervaded every unit at this time was due to the order in which men were to be released ; which, while it might be in the interests of the nation as a whole, failed to take into account individual claims due to length of service. Coal, for instance, being necessary in every form of manufacture or commerce, everyone employed in the coal mining industry became a pivotal man, even though he had only recently joined up. Moreover with a hastily improvised machinery, assembled on a sudden to undertake a novel and highly intricate business of great detail, there were many conflicting orders and counter-orders and the manner of selection was arbitrary and liable to abuse. One of the few pivotal men discharged in the R.A.O.C. was a barber's assistant, whose master presumably claimed him as indispensable.

Nowhere was the plan more keenly resented than among those Corps from which practically no one would be set free until the last. To contend that they were less deserving of release than their comrades who had borne the heat and burden of the day in front line trenches would fail to recognize the position as it then stood. For some two years past all non-combatant Corps had been shorn of their fit men and their ranks filled with the disabled, who had often far longer service than those at that time at the front.

There was no longer the sustaining stimulus of a patriotic ardour. Everyone was intensely war weary and yearned for home. There was a great and well-founded belief that jobs could not be found for all. Many of those first released had only recently been conscripted and had previously been earning a far higher wage under far easier conditions in England as civilians. Men compelled to toil on had not only to watch this process but also to see those who had never been called on to serve entrenching themselves perhaps in the very billets they had themselves surrendered voluntarily at the call of war. For them, meanwhile, there opened a new vista of seemingly endless work, of the necessity for which they could not be persuaded.

The army of 1918 moreover was composed of very different stuff from that of 1914; particularly Corps such as the R.A.S.C., R.A.O.C., the Railway Operating Staff, etc., which contained so many temporarily enlisted artisans imbued with a trade union spirit and devoid of the traditions of the "Old Contemptibles." During the war labour troubles had been rife in England where employees had gained their ends by means of strikes; and conscription brought to France amongst others agitators, only too anxious to foment trouble and emulate the doings of the Bolsheviks in Russia; an ill leaven for a dough of discontent.

Resentment quickly became rife. Protests were framed but bore no fruit; and at many centres both at home and abroad there were organized outbreaks. In the Ordnance, the fire, after smouldering awhile underground, burst into flames at Calais in the Valdelièvre workshops where, in January 1919, there was a general and concerted refusal to work until this wrong had been set right.

All these acts, which at any other time would have been severely repressed, now actually brought about what lawful representation had failed to effect. The original demobilization scheme was abandoned. It was directed instead that henceforth the rule in selecting men for discharge should be length of service—the first to join, the first to go; and the embargo on the release of men in administrative Corps was removed. That it should have required such serious breaches of martial law to obtain justice shows that the authorities had failed to grasp that, with the cessation of warfare, the constraining and restraining bonds of military discipline could not be relied on to suppress a genuine and acute grievance among a citizen army.

This change in the order of demobilization, moreover, altered the manner in which regimental equipment was dealt with. There were now regiments that found they were due to release at once the greater part of their officers and men, leaving no one to look after their stores; and eventually those who took mobilization equipment

to England were comparatively few, most units, both at the front and on the lines of communication, returning the whole of what they possessed to the Ordnance prior to embarkation. This in its turn largely added to the work of the R.A.O.C. overseas ; and in point of fact it proved impossible to set free either officers or men of the Ordnance when due to be demobilized, such was the stress of work. In March 1919 there were 4000 in France alone who were due for release but who could not be spared, mainly clerks and storemen, for there was less work now for the artificer. To some extent personnel could be transferred from duties that lapsed to others that were intensified, and some hundreds of young infantrymen were sent to assist, while after great pressure the War Office finally sent reliefs from home ; and thus eventually the back of the work was broken.

Although the Armistice only implied a suspension of hostilities, and demobilization did not start in right earnest till some time later, yet from the date of its signature the work began to be on a different plane. The very first step was to shut down the shipment from home of munitions and other warlike stores, to review and reduce wherever possible demands for other categories, and to confine repairs to those of a simple nature to equipment likely to be wanted in the near future. Premises had been rented for the duration of the war and at once the French began to press for their release, especially at Havre, their great commercial port on the Atlantic, where we occupied a large part of the docks.

Thus the policy of evacuation decided on was as follows. A new receipt depot was opened at Dunkirk for stores which would ordinarily have been returned to Havre, inland depots were to empty their contents into the base ports and the latter were then to be cleared starting with those on the Seine, the last to remain being Calais. By the end of 1918 all our Armies were based on Calais ; such portions of the stocks at Havre and Rouen as were still wanted being transferred to Calais by sea, while other goods were being shipped to England. By April 1919

the work of clearing Havre was sufficiently advanced to permit of all our hangars in the docks being released. The A.D.O.S. Provision at Calais then became the universal provider under the title of A.D.O.S. Provision, France; while the D.D.O.S. L. of C. South, and C.O.O. Ammunition South, disappeared. This, however, by no means implied the complete evacuation of the southern area, for every depot had to stay open so long as there were demobilized soldiers passing through or goods remaining on Ordnance charge.

In forward areas the immediate effect of the Armistice was to create an unprecedented call for tentage and accommodation stores of all kinds; for, not only had the Germans indulged in wanton destruction whenever they had the opportunity, but it was important to make those compelled to remain during the winter as happy and comfortable as possible. Among other steps, mobile workshops were turned into schools of instruction where the soldier artisan, grown rusty at his trade, could undergo a refresher course to regain experience in the use of his tools. A similar step was taken at the bases where classes were started not only in craftsmanship but in mathematics, draftsmanship, mechanics, and even in general cultural subjects such as English literature, history, civics and foreign languages. This action undoubtedly did something to allay the general unrest.

At the same time battle-field salvage became a principal instead of an accessory duty. A large tract of country had been covered during the summer and autumn which was littered with materials of all sorts, British and German, for we had left much behind in our advance and the enemy had been compelled to abandon far more in his retreat. Round Namur alone were found 1200 barges containing thousands of German machine guns and other warlike stores. These gleanings were formed into dumps, the contents of which were subsequently evacuated to the rear, disposed of in situ or destroyed if valueless.

Salvage operations were specially onerous in the case of ammunition, of which many thousands of tons were

scattered over the face of the country at small roadside dumps and refilling points and in old gun-positions, battery lines, dug-outs and trenches—all unguarded, uncared for and deteriorating. The first step was to locate these, for which purpose each main area was divided on the map into smaller areas which were systematically searched in turn. What was found had to be handled with extreme care. Blind or dangerous shell, bombs and grenades were destroyed where they lay and the rest removed with equal care to central dumps. Dealing with enemy ammunition in particular was a very risky business as fuze mechanisms, etc., were not so well understood as our own and the enemy might of set purpose have left it in such a state that an explosion would occur when it was touched. The ammunition thus collected had next to be sorted out. What was worth keeping was sent down the line and the rest blown up bit by bit after brass, copper and other valuable by-products had been saved.

All this required very careful supervision as so much bordered on a dangerous state; and the Ordnance Ammunition Units, on whom the duty fell, were reinforced by Ordnance personnel who could be spared for the time being from other work. While so engaged, Captain Toms and four others of the R.A.O.C. most unfortunately lost their lives and three more were wounded, weeks after hostilities had ceased. Apart from this, however, there was almost complete immunity from accident, both at the front and in the base establishments where breaking down operations were carried out on a far larger scale. Bourbourg and Conteville, the last two ammunition depots built, were set aside for captured ammunition, while at Zeneghem an immense area was earmarked for brass cartridge cases and other recovered metals. It was impossible to expect the troops, engrossed as they were in the prospects of demobilization, to assist in such trying work during the worst weather of the year, and manual labour was furnished by German prisoners and Chinese coolies.

These preliminary steps were followed by measures to

deal with demobilization on a grand scale. One Army advanced into Germany and became the British Army of the Rhine. Controlled directly by the War Office, and with large depots at and around Cologne staffed by two Companies of the R.A.O.C., it became self-supporting. The whole extent of France and Belgium occupied by our Imperial Forces was divided into administrative areas. The Armies that remained gradually disappeared as fighting organizations but, with their administrative staffs, were responsible for clearing their areas. The last area was that of the lines of communication, the General Officer in command of which assumed supreme command.

In these areas were formed special Ordnance depots, styled Intermediate Clearing Stations, into which units dumped all their stores, except those few who, forming part of our post-war army, kept their mobilization equipment. At these depots everything as it poured in was taken on charge under a rough heading only. So heavy was the inundation that it was out of the question to make detailed examinations. Camps were formed at various ports, stretching from Antwerp in the north to Havre in the south, capable of accommodating in all some 100,000 soldiers, where each man's kit was refurbished before he sailed for home, old boots or uniform replaced by new, and dirty underclothing exchanged for clean.

Bearing in mind what existed in England, our national assets of war material were obviously far in excess of what could possibly be wanted to maintain our small peace army for many years to come ; in many cases they could not have been exhausted in hundreds of years of peace ; and the method of dealing with overseas stocks was as follows. The A.D.O.S. Provision, now a disposer rather than a provider, collected stock sheets periodically from each Ordnance centre from which he prepared consolidated surplus lists for the War Office. The War Office had then to decide what it wanted sent home ; as soon as it called a halt what remained in France was to be disposed of. These redundant stocks either remained at the dumps, depots or clearing stations, or

were concentrated at specially created demobilization depots, of which far the largest was at Beaumarais outside Calais.

With the actual disposal of this colossal residue the Corps was not concerned, except that the Ordnance officer on the spot was empowered to make small sales of ordinary commodities up to £50 daily. A special branch of the Ministry of Munitions was formed, styled the Disposals Board, to deal with every species of redundant war material, whether railways, buildings, foodstuffs, lorries, stores or clothing. Once an Ordnance establishment was cleared of everything to be sent home its contents were handed over in situ, with stock sheet, to an official of the Disposals Board, who became responsible for the subsequent proceedings. Much was wanted by the French Government to rehabilitate devastated areas, and much was sold by tender where it lay. Other agencies helped to reduce the residue. The large depots on the Rhine absorbed a considerable amount. There were our own released prisoners of war to be clothed and a detachment of the Corps, with a supply of clothing and comforts, left for Switzerland where so many were interned. The United States, among other trifles, begged half a million knives, forks and spoons for its dispersal drafts, a great deal was shipped to Russia, to assist anti-revolutionary forces to fight the Bolsheviks, and the rest came on the home market.

For ammunition the same plan was adopted. At the end of February 1919 a programme was drawn up by the War Office of what was to be returned to England; the Rhine Army absorbed a certain amount, Canada took 60,000 tons, Australia 80,000, New Zealand 10,000 and a quantity went to Russia.

But of shell alone there remained 350,000 tons and what to do with them was the difficulty. The first suggestion was to dump everything in the sea after recovering such commercial products as were worth the time and labour. This idea had to be abandoned because the enormous amount of shipping it entailed could not possibly be spared, especially as the Board of Agriculture

and Fisheries would not allow dumping except in certain rather inaccessible spots.

Meanwhile the R.A.O.C. ammunition staff was hard at work sorting out and sending home what the War Office had decided should be kept, after eliminating everything not of the highest quality. But as to breaking down the rest, it was only touching the fringe. Once the forward areas were cleared and such ammunition as was wanted was sent away, the military side of the work was really at an end. Soldiers enlisted for the war could not be expected to remain indefinitely in France and a commercial organization was better fitted to deal with a task which involved, for example, the emptying of millions of high explosive shell whose nitrate contents were of value as a fertilizer.

A Directorate of Munition Recovery had been formed in England to supervise and co-ordinate work of this sort ; and as a first step this Directorate set to work itself at Fressenville and the depot at Dannes. Next the Directorate, by then merged with the Disposals Board, took over the whole of our ammunition establishments in France and sold them with all their contents to firms of contractors who set up very elaborate breaking down plant to extract the full residual value from every category, British and German ; a job that occupied years.¹

This description of how the Ordnance dealt with its stocks in France after the war has not taken long to tell, nor indeed did the operation take so very long when everything is considered—the magnitude of the task, the shortage of staff, shortage of shipping, and the length of time that it often took to get disposal instructions from the War Office, or to get the Disposals Board to find staff to take over a depot. Yet, when the Peace of Versailles was signed at Paris on the 19th July, 1919, there were few Ordnance establishments which were not still at work and it was not until October 1921 that the last man of the R.A.O.C. left France.

¹ An account of the operations is given in Appendix VII.

PART II
OTHER ARENAS

INTRODUCTION

THE author served in France in several capacities, during which he had occasion to visit every type of Ordnance establishment and to see something of every phase of Ordnance life ; and, besides profiting from a perusal of war diaries, narratives and statistical records compiled by officers of the R.A.O.C., he has been aided by his own experience in writing the preceding pages.

But, except for a year in Mesopotamia at the tail-end of the war, his services were confined to France ; and the chapters that follow are almost solely based on the contributions of others—chiefly narratives written by senior officers present with each expedition who, with the best first-hand knowledge, recorded their experiences with the express purpose of compiling an Ordnance history of the war.

The author's rôle has been confined mainly to editing these narratives, chiefly with a view to avoiding the repetition of matter already described under the Western Front. The reader of the preceding pages, it is thought, should have no difficulty in picturing Ordnance establishments at a base, similar though less in magnitude to those in France ; and in the same way it may be taken for granted that Ordnance services at the front were organized on the same general principles though modified to suit different conditions.

Descriptions of these establishments have therefore been omitted, unless there has been some special reason to refer to them ; and the author's aim has been rather to bring into relief the special features of each campaign in their bearing on Ordnance work, to show how the organization differed in each, and to enshrine in the pages of its history such important or picturesque episodes in the life of the Corps in these different arenas as seem worthy of permanent record.

Each campaign had its special characteristics, due mainly to the physical features of the country, its climate and the amount and nature of the opposition encountered ; and these characteristics were invariably reflected in the

system of supply, which had to be plastically moulded to meet very varied conditions, with expansion here or contraction there. Nothing, for instance, could be more different than the conditions in France, where every branch of Ordnance work was highly systematized and specialized, and those in Gallipoli where a purely hand-to-mouth existence was led. There could not well be a greater contrast than between the type of warfare in Macedonia with lines of trenches situated 50 miles from the base at Salonika, and that in Palestine or Mesopotamia where advances were made over hundreds of miles of territory and where, in one case, over 1000 miles separated the troops from their sea base. And, even though there was this similarity between Palestine and Mesopotamia, the nature of the line of communications made it necessary to adopt an entirely different type of organization in each country. In East Africa, again, guerilla warfare made the problems very different, and in Russia and Siberia Ordnance work, though on a lower plane, was conducted in peculiar and, in their way, unique circumstances.

At the same time certain features were common to all; and, again to avoid repetition, these can be conveniently generalized here.

One common factor was anxiety lest stocks should run short, the greatest bug-bear of a D.O.S.'s life. France always had the first call, and any temporary shortage there could be quickly remedied. But it was a very different matter where months would elapse between the date when a demand was despatched and that on which it was fulfilled; and when the torpedoing, or even the delay, of some anxiously awaited store-ship was liable to have serious consequences. The War Office, with calls from so many directions, always pressed that stock margins overseas be confined within the narrowest possible limits, making it difficult to ensure that there should never be a shortage among the many thousand items dealt with by the Ordnance, the expenditure of which was apt to fluctuate so violently. Nevertheless, all things considered, the War Office managed to meet de-

mands from every source with wonderful efficiency ; and there was never any real ground for complaining that it had overlooked some minor theatre.

Another point is that nowhere was ammunition expended on such a colossal scale as on the Western Front, and nowhere did the problem of keeping guns in action or of ammunition supply present such difficulty. Ordnance Gun Parks were not to be found in these campaigns, and ammunition dumps were on a small scale. There were no heavy guns and howitzers and fewer of medium calibre. Heavy mobile workshops did not exist in frontal areas, the proportion of medium to light shops was smaller ; and the repair and examination of gun equipments figured less in their work, though it was by no means a negligible quantity. On the other hand, owing to the time taken in replacing an artillery equipment sent home, a heavier class of repair was sometimes undertaken in the base workshop ; and, in tropical and semi-tropical climates, ammunition needed even more attention than in France, to guard against deterioration.

Again, nowhere outside of France were huge reserves of battle stores accumulated at the front. Except at Salonika, where lines of communication were short, and at Gallipoli, where they did not exist at all on shore, warfare was usually of a far more open type, mobility more essential, and in either pursuit or retreat large reserves would have proved an incubus.

The regimental transport of our army, four-wheeled general service wagons for baggage and rations designed for use on good, or at any rate respectably level roads, and lighter limbered wagons, travelling kitchens and water-carts capable of moving across country on any fairly hard and even surface, answered on the whole excellently in France ; though even there they had to be supplemented by various forms of pack carrier in the trenches and shell-pitted areas.

But elsewhere the type and scale of transport had to be modified to suit the country, chiefly so as to eliminate the general service wagon, unfitted for mountainous regions without any sort of highway or for desert tracts

traversed by nullahs. Seeing that every unit was equipped in the first place as for France, and that there were numerous exchanges of divisions and individual units between the different war theatres, the task of re-equipping them to local scales was unending and involved a great deal of work in every subsidiary campaign.

The variety of forms of pack-transport in particular was very great, for each Force evolved its own patterns. There was mule and camel pack-saddlery for machine guns or mortars, for ammunition or miscellaneous equipment and for litters—the latter placed in pairs on a camel, carried tandem between two mules, or trailed behind one mule with the rear ends of the poles supporting the litter dragging on the ground. Rafts, from which to fire guns, were even extemporized in North Russia. Water again had often to be carried for both man and beast in special receptacles—either canvas bags (*chaguls*) or portable tanks (*fanatis* and *pakals*) which were of many sorts and sizes; while porous earthen water-jars and canvas troughs were wanted in camp or billet.

It is no exaggeration to say that plans of operation might depend more on transport and water supply than on guns, ammunition or even men.

All this involved a great deal of inventive genius. Improvisation in fact had to be resorted to very generally in these distant campaigns, where the only way of satisfying a call of an unexpected nature was by making something to answer the purpose in Ordnance workshops.

The last feature common to all these campaigns was the extremes of temperature experienced, which ranged from 130 degrees in the shade in Mesopotamia to 40 degrees below zero in Siberia, with far greater seasonal variations than in France and Flanders.

This affected the Ordnance in a variety of ways. Besides the most obvious—that the soldier had to be provided with clothes suited to his environment—disease was more prevalent, mosquito nets and other forms of protection from malaria being required. Not only had the number of hospital beds to be increased, but the

staff of the Corps available to equip them was diminished through sickness. The usual single circular tent was replaced by one of double canvas or by Indian tentage—rectangular with high double walls and roof and far more airy and cool than home patterns. The ordinary lubricating oil proved too thin in great heat and too viscous in great cold ; special liquids had to be devised for gun-buffers and the stability of cordite and other explosives was affected by either extreme of temperature. Altogether, in one way or another, the influence of climate on the work of the Ordnance was very marked in all these subsidiary theatres.

Before coming to these campaigns, however, an account must be given of the organization of the main base in the United Kingdom and the subsidiary base created in Egypt during the progress of the war specially to serve several of them.

CHAPTER IX

THE HOME BASE

IT lies beyond the scope of this book to describe the elaborate machinery set up in England during the progress of the war to furnish munitions, equipment and clothing for the armies of the Empire ; a machinery which had in the first place to procure from world-wide sources the raw materials wherewith to manufacture what was wanted not only by our military forces, but also by the Navy, the Air Force, and, to a considerable extent, our civil population and allies. All that need be attempted here is some description of that part of the machine which was controlled by the Army Ordnance Department and Corps under the Director of Equipment and Ordnance Stores at the War Office.

Except at its very beginning and end, the post of D.E.O.S. was held throughout the war by Major General Sir John Steevens, who was brought back from the retired list to fill that position. Sir John was by now past the grand climacteric and, though possessed of great ability and a very ripe experience, his brain was no longer so nimble as when, during the South African campaign, he had kept in his own hands not only every string, but each fibre of every string connected with the supply of stores and ammunition to the seat of war. Now, with advancing age and with business on such a much grander scale, he was perforce content with a general supervision, devoting most of his time to one only of the three main branches of his office—Q.M.G.7—and leaving the conduct of affairs in the others—Q.M.G.8 and Q.M.G.9—to two Deputies.¹

One of these, Brigadier General Wrigley (Q.M.G.8), dealt with all questions of personnel, being responsible for finding and training the men necessary to raise the A.O.C. from a normal footing of 248 officers and 2273 other ranks to an eventual strength of 2434 officers and

¹ A statement of the quantities, provided by D.E.O.S., of a few outstanding commodities will be found in Appendix VIII.



BRIGADIER GENERAL W. H. USHER SMITH,
C.B., C.B.E., D.S.O., D.O.S. SALONIKA



MAJOR GENERAL SIR J. STEEVENS, K.C.B.,
K.C.M.G., D.E.O.S. WAR OFFICE



BRIGADIER GENERAL P. A. BAINBRIDGE,
C.B., C.M.G., D.O.S. PALESTINE

39,190 others. The new officers were selected from those who, by reason of age or some debility, were unfitted for commissions in the battalions of Kitchener's New Armies, and were mainly, though by no means exclusively, drawn from the business world. The work gave scope for a great variety of talent and men from the stock exchange and mercantile houses, barristers, solicitors, chartered accountants, auctioneers, shipping agents, together with engineers, chemists, physicists and experts in other lines, were all welcomed as their specialized knowledge and training could be turned to good account. It was those connected with the engineering professions that had to be most eagerly sought for, to fill the post of Ordnance mechanical engineer. These, together with the armament artificer and armourer, were the hardest to come by, such was the demand for skilled munition workers at home. Commissions in the A.O.C. were also given to a number of master-gunners R.A., whose knowledge of ammunition and habitude in handling men proved extremely valuable. Q.M.G.8 also had to arrange for an immense expansion in the civil staff of home Ordnance depots, with very intricate questions of establishments and wages, rendered the more difficult by the ever-rising cost of living.

Many senior officers of the Corps have recorded their appreciation of the keenness, knowledge and adaptability displayed by temporary officers who served under them, many of whom, before the end of the war, held positions of high responsibility; and the same may be said of all grades. The material was excellent, the standard of intelligence and education high, and under the intensive culture of war conditions there arose a very fine body of officers, warrant officers, non-commissioned officers and men. Further, although labour troubles were rife in England, there was a striking absence of any such trouble among the civilians working in Ordnance establishments; men and women serving most loyally despite strikes in other branches of the labour market.

The next main branch of the D.E.O.S.'s office (Q.M.G.9) was in charge of Brigadier General Seymour,

now Duke of Somerset. Except that it had no concern with the actual procurement or design of technical warlike stores, a service for which the Master General of Ordnance was responsible, the duties of this branch ranged in peace over every question that concerned the equipment of the army. It had to provide, through the Director of Army Contracts, all non-technical stores whose purchase fell within the province of the Quartermaster General, to deal with questions of their pattern and inspection, and to supervise arrangements for the storage and supply to the army of every species of equipment, whether technical or non-technical.

With the progress of the war however, and the phenomenal expansion of business that brought into being a Ministry of Munitions to manufacture warlike stores and a Surveyor General of Supply to procure other kinds of material, the functions of Q.M.G. became more specialized ; in particular, it ceased to be concerned with ammunition.

The procedure evolved was as follows. All demands from overseas came in the first instance to this branch, where those for 'Q.M.G. Stores,' after scrutiny, were passed direct to the head of the main Ordnance depot at Woolwich, Major General Sir George Butcher. Demands for 'M.G.O. stores' were passed to one or other of the M.G.O.'s subordinates, the Director of Artillery or Director of Fortifications and Works, according to their nature ; finding their way also, subject to approval, to Woolwich. At Woolwich was to be found all the elaborate machinery of 'Provision,' and there were prepared the actual documents by means of which what was needed to meet these demands (or, to be more accurate, what was needed to replace the stock depleted in meeting them) was manufactured or purchased by the Ministry of Munitions or Surveyor General of Supply, and, after inspection, delivered either to Woolwich or some other stated depot. Such in general was the procedure, subject to modification in special cases ; the main exceptions being small arms, where the work was carried out by the Chief Ordnance Officer at Weedon, and ammunition,

to deal with which a new branch, to be described hereafter, was formed.

The next stage was to arrange for distribution to the best advantage among the different theatres of what was ready from day to day for shipment; a matter that required very careful control—not only to eke out the stock to the best advantage but also to economize shipping and rolling stock. This work, one that only came into existence owing to the war, was in the hands of Lieutenant Colonel Findlay, working under Seymour.

At the outbreak of war, some of the wharves at Newhaven and Southampton were allotted for Ordnance supplies, all the earlier shipments to France being carried out there. But it soon became evident that these ports would not suffice; and in 1915 Littlehampton was impressed and a part of the docks at Avonmouth allotted for shipments to other theatres; while boats for French ports also sailed direct from Woolwich and the Albert docks in London. Still later, stores for the East were despatched from Southampton to Cherbourg, whence they went to Taranto by rail and onwards by sea. As the war progressed it became necessary to increase transport facilities even further and provide means of taking heavy guns on railway mountings across the channel; and by February 1918 ferries, on which loaded trains were carried, were in operation between Richborough and Calais, and between Southampton and Dieppe, Richborough being also used for barge traffic, stores and ammunition in barges being towed across the channel.

The difficulty experienced by the Ordnance at the outbreak of war, owing to its having no hand in the despatch of its own goods in England, has been referred to already. This was rectified by attaching an Ordnance staff to the Embarkation Commandant at each of these home ports, who supervised and checked the loading of vessels, prepared bills of lading and ensured that vouchers were sent with each consignment. The whole of this staff served directly under the War Office, and the shipment of Ordnance stores became a very important part of the work of Q.M.G.9, the daily outwards consignment

averaging 360 truck-loads, a figure that excludes ammunition.

Our normal organization provided that stores of every nature should be delivered in the first instance to Woolwich for inspection and distribution, and in our past campaigns this plan had worked satisfactorily. But now the central depot at Woolwich was quickly overwhelmed, and the site was so constricted as to be incapable of expansion except to a very slight degree. This was perhaps fortunate, for the depot, cheek by jowl with the factories and laboratories and on the Thames close by London, was a constant source of anxiety when air-raids became frequent, though actually it never suffered any material damage. Warehouses were either hired or built in the docks on the river to which certain special categories of goods were delivered direct, and extensive premises taken over at main railway and manufacturing centres. By far the greatest relief to Woolwich, however, was afforded by the acquisition, early in 1915, of some 600 acres of land at Didcot, upon which a depot of corrugated iron sheds was built and opened in the following June.

Over all these establishments Sir George Butcher, as chief executive officer under the D.E.O.S., reigned supreme; and Didcot, under his general direction, became the main centre for delivery and distribution of 'Q.M.G. stores'—barrack, hospital and camp furniture and such-like bulky articles for which enormously increased accommodation was needed, while 'M.G.O. stores' for which, apart from ammunition, no such immense space was required, remained at Woolwich.

The depot at Didcot, one of the most important railway junctions in the south of England, with 1,500,000 square feet of covered accommodation, served by more than 30 miles of railway track and siding, was far better situated and infinitely better planned for work on such a gigantic scale than Woolwich, the growth of centuries, with its scattered storehouses, some in the Arsenal and some in the Dockyard, intermingled with factory buildings, cramped and badly served by rail. It could without

difficulty despatch complete trainloads of stores to the various ports and dealt on the average with 2000 truckloads a month.

The great difficulty at first was to find enough labour. The district, one of small scattered villages, was thinly populated and little living accommodation was to be had except in camp quarters erected in the depot. Several new Army Ordnance Corps Companies were formed at Didcot, but they were constantly depleted by calls from overseas. For some time it had to rely for labour on the inhabitants of the surrounding district and was helped by volunteers from the neighbourhood. Parties of ladies arrived daily and boys from Kingham industrial school. On one occasion masters and boys from Eton College worked at the depot, H.R.H. Prince Henry among them; and a number of Dons and Professors from Oxford with some of the Eton masters spent their Easter vacation there in 1916.

Gradually the labour situation improved and, in addition to the Army Ordnance Corps staff, two Labour companies, each 500 strong, together with 1560 civilian men and 756 women were eventually employed. By that time the depot had been enlarged and held every class of commodity; additional areas having been acquired to store ammunition and clothing.

Q.M.G.9 also had under its wing the inspection branch which, under Colonel Wortham, was responsible for the pattern and inspection of all 'Q.M.G. stores'; one that likewise underwent immense expansion, its staff increasing from 347 to 5700.

The normal procedure was for all deliveries by contractors to take place at Woolwich Dockyard, where the goods were examined before being finally approved and passed to the storehouses. But the available space soon made this impossible, and branches were opened at Didcot and many large commercial centres of which the most important was Birmingham.

Later on the work was still further decentralized by posting Viewers to contractors' works to examine goods during and after manufacture, a process that saved much

delay and congestion by enabling what had been passed as satisfactory to be railed straight into the depot told off for its reception. This was a plan, however, that required very close supervision, especially owing to the springing up of so many mushroom firms during the war, with only an ephemeral existence and no reputation to maintain; so that the possibility of collusion and bribery had to be guarded against. The permanent staff, experts in some special line of manufacture, served as a supervisory nucleus, training and leavening the new hands; while, to guard against misdoing, they toured round the works of manufacturers, where no junior was left for long with the same firm. With these precautions the plan worked satisfactorily as a war emergency measure; and there was certainly nothing to complain of as to the quality of what was supplied to our troops, even if the high standard usually insisted on had to be lowered.

Owing to the shortage in types of material usually employed for the army and so as to enlist all the manufacturing resources of the country, very wide latitude was allowed in departing from sealed patterns, and it was practically within the discretion of the Chief Inspector, with his expert advisers, to accept any substitute he might deem would answer the purpose. For instance, an immense sum was saved through the adoption of tentage made of a special weave of cotton (devised by Mr. Heylin, the Inspector of textiles, who was granted the O.B.E. for his services) owing to the scarcity and expense of linen duck; and it was the inspection branch that designed and superintended the manufacture in America of the leather accoutrements without which Kitchener's new armies could not have taken the field, such was the shortage of webbing, made in peace time by two firms only whose output normally was amply sufficient.

Many novelties demanded from overseas—such as new types of machine gun pack-saddlery—were also made up in the workshops by this branch which trained all army saddlers and employed over a thousand women textile workers.

During the first year of the war there was such a dearth of ammunition that no special arrangements for its storage in England were necessary, every available round manufactured being sent straight overseas. But towards the end of 1915, when the first of the National Filling Factories established by the Ministry of Munitions was about to begin output, it was decided that its products should pass into the hands of the War Office for storage and distribution.

Under the original agreement the Ministry engaged to hand over ammunition in complete rounds; but it failed to do so, with the result that the Army had to take over components and arrange for their assembly. Ordnance officers were posted to each factory to take charge of what was manufactured and the administrative charge of these new Ordnance depots was at first vested in the D.D.O.S. Woolwich.

With the removal of the supervising staff to London in October 1917, the office of A.D.O.S. Ammunition became a direct branch of the War Office in charge of Colonel Meares. Its duties embraced the receipt, storage and issue of all ammunition produced at the national factories or elsewhere, and it worked under the D.E.O.S. though also in close touch with the Director of Artillery, who dealt with demands from overseas and gave instructions as to what quantities were to be issued. Eventually there were twenty-six factories where stocks of ammunition were thus held, besides the peace magazines at Portsmouth, Plymouth, etc.; but even so the accommodation proved insufficient. Large central depots were created at Bramley, Altrincham, Credenhill and Didcot, with smaller ones elsewhere, the total accommodation on Ordnance charge eventually having a capacity of a million tons. All these establishments, with their staff and laboratories, were administered by the A.D.O.S. Ammunition. Shell were called forward from one factory, cartridges from another, tubes and fuzes from elsewhere and the complete rounds linked up by the Ordnance staff at the port of embarkation, where a stock of components was kept to make good any shortage.

It must be added that, although far closer compliance with customary regulations for the storage and conveyance of ammunition was possible in the United Kingdom than overseas, yet many of the rules had to be modified, such as that directing that special powder vans be invariably used to carry by rail explosives in bulk or in the form of cartridges. Nor was the construction of special compartments on board ship as magazines, customary in peace, attempted.

The last branch of the D.E.O.S.'s office (Q.M.G.7), that which Sir John Steevens himself closely supervised, dealt with clothing on the same lines as 'Q.M.G. stores' were dealt with in Q.M.G.9. Here the actual work of provision, storage and supply was in the hands of the Chief Ordnance Officer Royal Army Clothing Department, whose central depot at Pimlico was very soon snowed under, for clothing occupies enormous space, and the war resulted in many new requirements such as gas-masks, gum-boots and garments suitable for climates ranging from tropical to arctic.

Additional accommodation was taken up in London at the Great Central railway station, in Battersea Park, the White City and Olympia, besides premises in Manchester, Leeds, Edinburgh, Glasgow, Dublin and other centres of textile industries. If to these be added the clothing depots formed directly to serve the troops in Home Commands, the number of special establishments formed during the war amounted to eighty-five.

Hitherto, except for areas in the United Kingdom where offshoots of the central depot had been created, Pimlico supplied each unit direct with its clothing and necessities. This now became impossible with such a press of work on a gigantic scale, and during the war clothing, for the first time, was held in every Command, whether at home or abroad, for supply to the troops stationed therein. The process of decentralization was simple because full dress uniform was not worn but only service dress or khaki drill.

Another measure adopted with extremely satisfactory results was the handing over to Mr. (now Sir Edward)

Penton, head of a well-known firm of leather manufacturers, of all work connected with boots. By degrees Penton enlisted the entire bootmaking industry of the country and turned it on to making Army boots, not only for ourselves but also for several of our allies, the resources of the world having to be ransacked to get suitable substitutes to supplement the types of leather usually employed. A point overlooked by Germany in her war preparation was that she normally absorbed the whole of the kip leather exported by India. This now came to the English market; Germany had great difficulty in booting her armies, and to us it proved invaluable, the army being shod with a boot produced within the Empire.

A boot made of chrome-tanned leather, with machine riveted seams, was being tested just before the war broke out; but, before full use could be made of it, quantities of boot-making machinery had first to be manufactured. Out of the experience of existing types was finally born, in 1916, a boot that combined the best points of the British, French, Italian and Russian, and which could not only be made, but re-soled and heeled by machinery. Seeing the paramount importance to the soldier of good boots, it would be difficult to overrate the services of Sir Edward Penton.

The clothing inspection branch had never been independent of the depot as at Woolwich, where the Chief Inspector was directly responsible to the D.E.O.S.; and though the upper hierarchy of the technical inspection staff was skilled, it frequently happened that the junior grades would be filled by men transferred from the storehouses, with no qualification for such a special line of work.

Whether due to this cause or not, the only stain on the integrity of the Ordnance that came to light throughout the war was the discovery that two Viewers at Pimlico had been guilty of taking a bribe from a contractor and improperly passing some of his goods as fit for the service.

The case itself was trivial—a question of braces—though the importance of *quality* in every class of material for an army on active service, when replacement is likely

to be a matter of difficulty, cannot be over-stressed ; but the upshot was that Mr. Lloyd George, who was striving to enlist great Captains of Industry into the service of the State, placed Lord Rothermere, the newspaper magnate, at the head of the whole business of providing clothing with the title of Director General of Army Clothing. The post was next occupied by Sir Benjamin Johnson, a leading light in the trade, who, from his knowledge of manufacture and markets, was able to effect valuable economies in production. But neither of the two made any change in the general structure of the organization, and the military side of the work, storage and the fulfilment of demands, remained in the hands of the Chief Ordnance Officer, Pimlico.¹

With the progress of the war, as salvage became of such importance, a sub-branch of Q.M.G.7 was formed to deal with this aspect of clothing, under Lieutenant Colonel (now Sir V.) Willey, a temporary officer who specialized in this line of work and who also supervised all laundries established for the troops at home. A depot was formed at Dewsbury to receive the rags shipped home from overseas and condemned or repairable clothing from Home Commands. Inspectors were appointed who toured round the United Kingdom, examined the stocks held by units, ensured that nothing was cast that could be profitably repaired, and advised how equipment should be kept in order and used up to the best advantage.

The foregoing sketch has been devoted to the central organization to provide for our forces overseas ; but besides this the Ordnance at home had to furnish

¹ At the same time as Lord Rothermere was made Director General, Sir Thomas Polson, another man of business, was appointed Chief Inspector. Materials were perforce largely examined at the mills where they were woven and his report at the end of the war is worth recording. "The experiment," he writes, "has been successful in a measure, but should never be resorted to so long as inspection at a clothing depot is possible. Inspection must be entirely independent and the Chief Inspector's decision never questioned."

all the initial equipment of the citizen armies raised at home, a service which was unending ; for there was never a day when some new unit was not being raised or re-equipped from top to toe, right down to the last phase of the war when immense quantities of equipment and clothing were required by our American allies assembled in England before they could take the field.

The war work of Ordnance depots in the United Kingdom falls into four periods.

First came the mobilization of the Expeditionary Force, the issue of stores to place our ports, cable landings, etc., in a state of defence, and the shipment of the war reserves overseas. These operations, though they involved heavy work, proceeded with wonderful smoothness and celerity, so well had every detail been thought out in advance.

But, during this time, the vast majority of the serving officers and men of the A.O.C. marched off to the war, leaving nothing behind but the usual small peace maintenance stocks with the staff of permanent civilians ; and the next period, which lasted roughly till the end of 1915, was unquestionably that of the greatest stress and strain. No sooner did the Regulars leave than the Territorials were mobilized and recruiting began for Kitchener's new armies ; and the assembly, during the next few months, of 19 new Army and Territorial divisions, with individual units equivalent to a further five divisions, taxed every resource to the utmost.

The key-note of this period was improvisation. Not only had an extemporized form of accoutrements to be employed, but the same held good as regards every other want. To take one item alone, the number of sets of harness in use increased, before the end of 1915, from 40,000 to over half a million ; and large orders for harness and saddlery, water-bottles, tools, mess-tins and so forth, of any suitable pattern that could be quickly got, were placed in the United States, Canada and India to supplement output at home. No less than half a million suits of blue serge uniform, the only colour to be readily

bought, were ordered and a similar number of civilian overcoats from ready-made stocks.

In response to Lord Kitchener's appeal for men, his new levies descended like avalanches on every command. Winter was coming on, the men were usually devoid of sufficient raiment to withstand cold weather, and the first imperative step was to provide them with furnished lodging and suitable clothes. Every inch of barrack accommodation was soon double-banked, and hutted or tented camps sprang up all over the country.

No Ordnance officer, of whatever degree, and whether at Aldershot or Alderney, but was faced at this time in some measure with the problem of having to make bricks without straw; and his difficulties were accentuated by the fact that he had to rely on newly joined men, that he had no sooner trained them than they were likely to be sent to France, and that commanding officers and quartermasters of new regiments were ignorant of military methods. Even when they knew what they wanted, they would not know how to set about getting it or whom to apply to, and required far more nursing than regulars.

At this time not only were Woolwich and Pimlico given practically *carte blanche* to make any bargains they liked, but also the A.D.O.S. of every Command; and units were further encouraged to help themselves by direct purchase of needful articles. This unquestionably led to extravagance. Different areas in the kingdom made purchases in competition, and zeal was apt to outrun discretion; but in such a state of emergency it was essential to throw to the winds considerations of cost. Properly drawn up contracts based on tenders would have taken weeks to fructify, and every hour was precious. For example, the C.O.O. Dover in six weeks expended over £100,000 on shirts and other necessities for the first batch of recruits. Articles were got in every conceivable way from every possible source; and even the most petty tradesman's stocks were impressed for, it might be, a few tables or chairs or pairs of boots. Welcome relief was afforded by the offer from the War Office of a sum of

money to each recruit who joined up with an overcoat, and an appeal in the Press from Lord Kitchener for gifts of blankets was generously responded to.

But to house and clothe the recruit was only the first step in the formation of an army which, before it could be trained to fight, had to be supplied with military equipment. And here also, until equipment serviceable for war was forthcoming, improvisation was the order of the day. Unserviceable rifles were unearthed and dummies made, which passed from man to man for the earlier stages of drill. Obsolete guns or wooden substitutes were mounted on ancient carriages, drawn by harness composed of bits of old leather pieced together, farm wagons were hired; and, as one division was supplied with service equipment, these oddments were passed on to the next and so the work continued. That the departure of no unit was actually delayed owing to deficiency of equipment or uniform was only due to very strenuous exertion; many got their last quota at the eleventh hour, but all were actually complete to scheduled time.

Towards the close of 1915 these initial difficulties were being tided over, ushering in the third period, when organization re-asserted itself. By now the whole industry of the country was harnessed to war work, supplies of all sorts were beginning to flow in regularly, and the staff was trained to deal with them. Each event was no longer a novel problem bristling with unexpected difficulties, there were precedents to go by; and though there was no letting up in the volume of work, yet it was of a more routine character. Existing depots and workshops had been enormously expanded, numerous new ones were functioning with regularity, command boot-repair shops and laundries were at work and command clothing depots to supply new or deal with old clothes, while the newly created ammunition depots were busily engaged.

Yet there were always unanticipated difficulties to be grappled with. During the Fenian rebellion, for instance, all depots in Ireland were a source of serious anxiety and had to be very carefully safeguarded, especially those holding arms and ammunition; and large

quantities of captured or voluntarily surrendered small arms—rifles, shot-guns and pistols—with their cartridges had to be taken care of. At Dublin, a barrack store was fired and gutted by the rebels and all its contents lost, attempts were made to fire the Ordnance magazine at Phoenix Park and a convoy of rifles and grenades was attacked at North Wall and repulsed by a convoy of the A.O.C.¹

London, again, developed enormously as an Ordnance centre. Ordinarily the troops in the metropolis drew their equipment from Woolwich, but now the public parks were converted into camps and hospitals with large store depots to serve them. Here also there was work of a very special character to be done when air raids became almost daily occurrences. There were eventually 160 anti-aircraft guns of various types in and around London to be maintained, repaired and supplied with ammunition, and unexploded enemy bombs to be collected and rendered innocuous, central and travelling Ordnance workshops and laboratories being established for the purpose.

Though this chapter deals with the United Kingdom, it may be convenient to refer at this point briefly to foreign Ordnance stations. These all had extra burdens to bear at a time when they had been stripped of most of their trained military personnel. Every fortress abroad was placed in a state of defence at the outbreak of war. Levies, white and coloured, were raised and equipped, guns and ammunition for men-of-war and armed merchant vessels supplied and examined, the survivors of torpedoed vessels succoured, and in many cases some special article of equipment, only procurable locally, had to be manufactured for some fighting front. When the German

¹ At a parade of those of the Corps who took part in these events, the Commander-in-Chief in Ireland conveyed his appreciation of their services. The officers were Lieutenants Jarman and Phillips, and Major Farquaharson and Lieutenant Hadoke, the two latter attached from infantry regiments. Lance Corporal Jarvis, in charge of the escort, and Mr. McClusky, foreman of the magazine, were specially commended.

fortress of Tsingtao was captured by Japan, quantities of war material were taken over at Hong Kong; and the Ordnance at Bermuda were able to furnish valuable aid to the United States by carrying out repairs to its flotillas of small craft.

During the fourth and last epoch of demobilization (when Sir Harold Parsons had relieved Steevens at the War Office), an entirely fresh set of problems had to be faced, though the Ordnance officer at home was spared one anxiety that intensified the difficulty of this period overseas. In France and other arenas, the aftermath of war had to be gleaned with a constantly dwindling and discontented staff, but in the United Kingdom there was no difficulty in getting labour of a sort—the labour market was glutted with demobilized soldiers.

While however this eased matters for the time being, the evil day was not to be avoided for long. In the following year army expenditure was once more budgeted for in parliamentary estimates; and, thence onwards, ruthless pressure was brought to bear to diminish the cost of every Ordnance establishment. To reduce staff is always a delicate and invidious process, and was never more so than at this time, when work was still far in excess of the normal, when there was great labour unrest, and when weeding out could not be accomplished without involving hardship on men who had served their country faithfully and perhaps been invalided from the army.

Except for those who were to form part of the post-war army, every man who had joined the colours handed in his arms, accoutrements and any special equipment or clothing before returning to civil life. In each command premises were set apart where these were checked over in detail and briefly examined; after which they were collected and stored in depots allotted for the purpose.

One by-product of this conversion of swords into ploughshares well illustrates the extent of the work. Any man who so elected was entitled, by forfeiting a special bonus of 52s. 6d., to a suit of plain clothes—blue,

brown or grey according to his choice—with a cap, collar and tie, on sending his measurements and address on a printed form to the R.A.C.D. Most took the bonus, but some preferred the plain clothes. To meet their wants a Discharged Soldier's Suit Section was formed at Battersea Park in December 1918, remaining open till August 1920; and during this time it sent out one and a half million suits by parcel post and dealt with two and a half million letters.

But to cope with personal equipment and clothing was a trifle compared with the task of collecting, classifying, renovating and housing the enormous mass of guns, ammunition, wagons, harness and indeed every variety of goods that at once began to pour in from all directions.

Every military establishment in the United Kingdom formed for the purpose of war began to close down and disgorge its contents. There were large outstanding contracts at home, in America, etc., that had to run their course, and stocks in the hands of manufacturers had to be cleared. Premises, temporarily acquired, had to be released to enable the ordinary work of the country to be got going. Although immense stocks were sold in France and other theatres, it took long to ascertain what would be surplus to the needs of a post-war army whose responsibilities could not be gauged while the world was in a melting pot, and meanwhile war depots on foreign soil had to be cleared. All this gigantic residue had to be accommodated somehow in the United Kingdom.

To meet the situation, long foreseen, the War Office had entered into an agreement with the Ministry of Munitions to take over three of its largest munition factories—at Georgetown near Glasgow, at Aintree on the outskirts of Liverpool, and at Chilwell in Nottinghamshire. All three were soon filled to repletion, while every other depot overflowed.

The return to anything like normal conditions occupied years. The Disposals Board, an offshoot of the Ministry of Munitions to which was entrusted the disposal of all surplus war materiel, had to spread its sales over lengthy periods. Markets were inundated with commodities of

a civil or semi-military character and to have sold everything at once would have resulted in ruinous loss—even as it was the prices fetched were often ridiculously low.

Moreover, the military commitments of the Empire remained for long abnormal. There were riots in Egypt, insurrections in Mesopotamia, unrest in India and next, graver trouble in Turkey ; and it was not until these subsided and Mandates were sanctioned for the government of territories ceded by our late enemies, that the world situation gradually crystallized and it became possible to forecast with any degree of accuracy the duties, and consequently the strength, of the British Forces of the future, the armament of its artillery, etc., and decide definitely what stocks were clearly redundant.

The figures, as they were arrived at in general terms at the War Office, were communicated to Woolwich and Pimlico, which called periodically for stock lists from every Ordnance centre. Then would follow intricate transfers of stock to clear, one after another, the temporary depots whose release was being pressed for, with the resultant throwing up to the Disposals Board of some particular block of stores—for choice those not of strictly service pattern or up to the usual standard ; and so the process would continue.

The policy was to release premises temporarily acquired as and when they were no longer required, reduce to manageable proportions the stocks held at the permanent peace depots, concentrate the balance at the three great munition factories taken over, and finally to clear these in turn, first Georgetown and Aintree, and lastly Chilwell.

It was for some time hoped that Chilwell might be kept permanently as a main Ordnance Depot to supplement Woolwich and Pimlico, as it was well adapted for the purpose, and centrally situated in the heart of the Midlands manufacturing district. But the proposal was vetoed by the Treasury on the urgent plea of economy ; and the net result of the War was the acquisition of Didcot for ' Q.M.G. stores ' in exchange for Woolwich Dockyard ; while for nearly ten years the army continued to live on its slowly diminishing war stocks.

As for other services so for ammunition. It was impossible to shut down with the stroke of the pen which signed the Armistice all the great organizations engaged on the production of munitions, and for awhile their output had still to be taken into Ordnance charge. The result was that depots became congested and the state of things became even worse when the movement of ammunition back to England from abroad began, the overcrowding at some places reaching a point which gave rise to considerable anxiety.

The disposal of these great accumulations presented many difficulties. Gradually however decisions were arrived at that certain types and makes, which were not considered to be up to the highest standard as to quality, should be disposed of ; and the process of breaking down was undertaken at certain Ministry of Munitions factories, notably at Hereford. At the same time contracts for breaking down on a large scale by private firms were being considered, and eventually an agreement was made with one firm, which was to take over nearly the whole of the ammunition then surplus or later to be declared surplus at agreed prices, and break it down. This entailed the movement of hundreds of thousands of tons to Farlington near Portsmouth and to other places where the plants for breaking down were established. It was decided to retain Bramley permanently as an ammunition depot, and there the firm were also permitted to establish a breaking down plant which resulted in a great saving in transport. Large quantities of propellant were also destroyed by the R.A.O.C. at Bramley.

From the technical point of view the processes presented many features of great interest, but these cannot be dealt with here, beyond saying that the work was carried out with great rapidity, once it was well started, and with almost complete immunity from accident. Most of the explosive was destroyed by burning, and the ammonium and potassium nitrate and metals were sold in the public market.

CHAPTER X

THE BASE IN THE LEVANT AND MEDITERRANEAN LINE OF COMMUNICATIONS

IN February 1915, when the War Office first proposed to cooperate with the Admiralty in attacking the Dardanelles, a small body of the Corps sailed from Avonmouth for 'Base B,' the code adopted to denote these operations.

Owing to its proximity, the site suggested for this base was the Island of Lemnos in the Ægean Sea, the place of assembly of the fleet.

A survey of the Island, however, showed that it did not even possess a pier to which ships could tie up, and time did not admit of large constructional works being undertaken. Alexandria on the other hand, the commercial port of Egypt, with its fine harbour and docks, was a very suitable site for a base. Its geographical position was favourable, and there existed in Egypt large manufacturing and repair establishments connected with Government services. It was, therefore, decided to instal the Ordnance base at Alexandria.

The decision proved to be an act of prophetic wisdom, for the small Ordnance detachment which, with nothing beyond a small quantity of clothing and small-arm ammunition, set up its tents at Alexandria in March 1915, formed the nucleus of the Levant base which was to fill such an important rôle in the years to come as a great central clearing house for Ordnance services throughout the Near East.

At first the new depot was stocked by calling for assistance from the existing peace depots of our Army of Occupation in Egypt at Cairo and Alexandria ; but there was fighting on the Suez Canal, which the Turks were attacking from across the Sinai Peninsula, and not much could be spared.

The system of supply to our troops at Gallipoli will be described in the next chapter. It will suffice here to say that, though in some cases store-ships sailed direct to the advanced base later formed on Lemnos, the most

practicable and usually adopted plan was to send freight from home in bulk to Alexandria and there load up cargo boats for Lemnos with miscellaneous consignments of what was immediately wanted.

Conditions in Gallipoli, where we could do no more than maintain a precarious foothold on shore, were not such as to call for a great variety of equipment ; and the year 1915 was largely spent at Alexandria in getting matters ship-shape. Nevertheless, as trench warfare developed on that Peninsula, Alexandria had heavy calls to meet from local sources. There was at the time a great scarcity of trench munitions. Designs of mortars, bombs, grenades, and so forth were improvised ; the articles were made in Egypt and sent to Gallipoli.

The really arduous work began in 1916, the most strenuous year of all for the Levant base. The extent to which Alexandria developed as a military port can be gauged by the following clearance figures of shipping :

	<i>Commercial</i>		<i>Government</i>	
	<i>Ships</i>	<i>Tonnage</i>	<i>Ships</i>	<i>Tonnage</i>
1914	1667	3,299,099	93	662,658
1916	554	966,763	1283	6,792,115

The attempt to capture Gallipoli failed and at the beginning of the year the troops engaged on the operation arrived in Egypt in a destitute condition, having to be re-equipped from top to toe. To outfit them with transport was in particular a heavy job, for none had been wanted in Gallipoli. Concurrently, all the stores from the advanced base at Lemnos and those saved from the Peninsula itself poured into Alexandria, there to be sorted out, cleaned and mended. At the same time operations in the Balkans were being undertaken and it fell on Alexandria to stock the depot at Salonika ; preparations were being made for an advance east of the Suez Canal and there was what became the Palestine Expeditionary Force to be provided for ; and equipment was needed for the British divisions which were being despatched from Egypt to Mesopotamia to reinforce the original expedition sent there from India.

All this entailed heavy demands on England, and a particularly severe bout of work. All told, 71 store-ships were dealt with at Alexandria between the 15th January and 15th March, and as much as 700 tons was sent out from the depot in one day, by land and sea.

It was now that the Alexandria depot began to have a separate entity under Colonel (later Brigadier General Sir Robert) Jackson. While not directly connected with any one campaign, it replaced Woolwich and Pimlico as a central base and distributing agency for several, a rôle for which it was admirably situated.

To begin with Egypt itself served as a pivot between our campaigns in the east and west. As the fortunes of war called for the transfer of divisions from one theatre to another, it was through Egypt that these transfers took place. Consequently there were in the country very extensive military establishments of all sorts for which Alexandria had to provide. It catered for our three principal campaigns of the Near East—Palestine, Salonika and Mesopotamia. It supplied Lawrence's Arab force operating from the Hedjaz, Aden where there was desultory fighting, and had dealings with East Africa, the Persian Gulf and India.

This wide field of activity gave scope for foresight to a very unusual degree; and the Levant base was fortunate in having as its chief Sir Robert Jackson, who had charge of 'provision' duties during the South African War and had made this branch of Ordnance work his hobby. The special utility of the depot at Alexandria lay in the relief it was able to afford to hard-pressed institutions and manufacturers at home. By meeting calls of a varied character from numerous sources it saved many petty demands on England from every eastern part of the world.

In this the engineering and other establishments connected with the railways, ports, docks and so on of Egypt rendered very valuable help. The railway workshops turned out gun fittings and even made complete machine guns, except for barrels and barrel-casings. But this was only one of many lines in which assistance was given.

Articles such as pumping machinery, camel and donkey pack-saddlery, water-tanks, desert ambulance carts, wagon parts, sand-tyres and pedrails were manufactured wholesale. There were large numbers of refugees in the country, and the Egyptian refugee administration set up factories where a thousand women were engaged in the making of garments and other textiles; besides which local contractors were extensively employed on army work. In all, goods to the value of two and a half million sterling were purchased. As an instance of the care taken to tap every local market before calling for assistance from home, it may be mentioned that bungs were made from the cork trees of Southern Spain whose bark was obtained direct.

The depot, in charge of Colonel Travers, occupied a large acreage at Gabbari, a suburb south-west of Alexandria, where a very extensive workshop also existed. Still further out, four miles from Alexandria, a fine and widely spaced ammunition depot and laboratory was built at Mex, in the desert between Lake Mariut and the Mediterranean.

Rather different arrangements came into force after April 1917, when it was decided to send reinforcements of men and materials to and from the East by rail across Europe. The decision was come to owing to losses by submarine over the long sea route and to economize shipping. This land line of communications with the Mediterranean was at first organized and administered by France. Its headquarters, which included an A.D.O.S., were at Lyons, and there were transit warehouses, hospitals and reinforcement camps at each of the two termini—Cherbourg on the west coast of France and Taranto at the foot of Italy—with rest camps at various points *en route*. It was estimated that 300 tons of stores and ammunition could be despatched in this way daily, either ordered by the War Office out of one of the big depots in France or, more usually, sent to Cherbourg direct from England, and re-shipped on arrival at Taranto.

Next, in August, the War Office undertook the management of the line, posting its own headquarter staff at Paris, though this made no difference to the manner in which Ordnance services were organized. Finally, in the late autumn of the same year, when two Corps were sent from France to the Italian front, that part of the line on French soil was once more taken over by France, while from the frontier onwards the part on Italian territory came under our Expeditionary Force in Italy. C.O.O. Paris then became directly responsible for Ordnance services on the former portion, and D.D.O.S. L. of C., Italy, on the latter.

The plan worked admirably for personnel and was no doubt the means of saving much loss ; but it was not an unmixed blessing from a departmental point of view. With a journey partly over railways whose capacity was limited and partly by sea, and with two transshipments, there could not be an even flow. There was always danger that articles urgently wanted might remain in the transit warehouses and be overtaken and passed by others despatched later, besides which some important component part of a special consignment might be shut out of a ship at Taranto from want of room and have to stay over till another arrived. Moreover, even if all went well, the journey for stores, which were liable to be side-tracked to make way for troops, took substantially longer than by the all-sea route.

During the German advance of 1918, traffic over the line practically came to a standstill for a time, as every axle was needed to convey supplies in France ; and though this service was undeniably far the most urgent, all our campaigns elsewhere suffered temporarily from the block in their communications with England.

From 1917 onwards ships sailed straight from Taranto to their final destination, Alexandria, Salonika or Kantara—the main depot on the Suez Canal of our expedition in Palestine—or else, passing through the Canal, proceeded to Mesopotamia or India. But though this afforded relief to the Alexandrine base it was apt to result in goods going astray. To such an extent did this happen that

D.O.S. Salonika eventually found it necessary to post one of his officers at Taranto to watch over his interests and see that his stores did not go to Egypt or vice versa.

Moreover the Taranto route failed to eliminate the danger of submarine attack during the passage of the Mediterranean, where U-boats constantly lurked in search of prey. Many valuable cargoes and far more valuable lives were lost, the entrance to the harbour at Alexandria being a particularly dangerous spot.

One of the worst shipping disasters of the war occurred there on a Sunday at the close of the year 1917, when the troopship *Aragon* was sunk near shore in front of the Ordnance depot. This happened just at dinner time, when the whole of the A.O.C. were present and turned out to succour the victims. The first to arrive were nursing sisters, who were accommodated in the sergeants' mess, while the 900 male survivors were looked after in the men's quarters. With few exceptions all had been immersed and were in a state of exhaustion. Hot drinks, warm blankets and dry clothing were quickly forthcoming, the Corps being the means of saving many lives. More than 80 bodies were recovered and brought to the depot for burial. The very next day, the last of the year, the *Osmanieh* was sunk in the same spot, and the survivors also brought to the depot for treatment, the dead on this occasion including seven Sisters. In no establishment, save a vacant hospital, could the shipwrecked have been so well succoured.

Although, once the Taranto route was opened, Alexandria was relieved of the actual labour of handling many of the stores sent from England to the East, it continued to provide everything wanted by Palestine, relieving the D.O.S. of that force of a great deal of work. It dealt with all demands from Mesopotamia (unless met by India), fulfilled them as far as it could and arranged for the balance to be supplied from England. It still had to furnish all that was wanted in Egypt and the Soudan and much for other outlying places. For Salonika however it only supplied such articles as could conveniently

be spared, the bulk of what was wanted in that theatre going straight from England.

Notwithstanding this relief the Levant base continued to expand, particularly in connection with manufacture and repair services. With the progress of the war salvage became an increasing liability and the Government factories of Egypt, especially the railway establishment, were busily engaged on constructional work for the railway that was being extended through Palestine. They were no longer able to devote attention to Ordnance work which the Alexandrine base depot had to undertake in its own workshops.

During the period of demobilization, this base also proved very useful. It was able to set off a deficiency against a surplus elsewhere; and continued to act as a general clearing house for the Near East until it was gradually closed down and replaced by the peace depots of our Armies of Occupation in Egypt and Palestine.

CHAPTER XI

GALLI POLI

WITH dead-lock on the western front, the capture of Constantinople seemed a very tempting objective. By opening a passage to the Black Sea it would have put the granaries of Russia at the disposal of ourselves and our Allies. At the same time it would have made it much easier to supply Russia with those munitions of which she was so in need and which could only be landed at North Russian ports on the Arctic or else at Vladivostok. By severing the connection between Europe and Asia on the other hand it would have stopped supplies which were able to pass freely between Germany and Anatolia once Serbia was crushed. The Turk, though a fine soldier when ably led, would have been very helpless in modern warfare without German efficiency and German munitions. Serbia in fact might have been saved as Bulgaria, waiting to see which way the cat would jump, might have ranged itself on our side instead of with Germany.

Once Turkey entered the war the Bosphorus provided a flank lending itself to combined sea and land operations which we were particularly well fitted to undertake; and Russia, hard pressed, was anxious for her allies to make a diversion in this quarter.

France needed every man to defend her invaded soil and it was left to our War Office and Admiralty to discuss plans for a combined attack on the Dardanelles. There was much vacillation. At first it was proposed to send out the 29th Division, but all our newly raised troops were committed to France where there were constant calls for men. The decision was rescinded, and only after the Admiralty had started operations at the Dardanelles single-handed did Lord Kitchener at the War Office finally agree to cooperate.

The first step therefore consisted in the despatch of a squadron of British battleships of pre-Dreadnought type and of little value in a naval battle, together with a few French men-of-war, to attempt

the passage of the narrow straits opening into the Sea of Marmora.

On the 19th of February 1915 the forts at the entrance were quelled and, after sweeping for mines, the fleet advanced and attacked the defences at the Narrows opposite Chanak, only a mile wide, on the 18th March. Here, after carrying out an intense bombardment, it was compelled to withdraw after several ships had been sunk by mines and hundreds of lives lost.

Thus ended a naval demonstration whose only effect was to cause the Turks feverishly to strengthen the Peninsula and pour in troops and munitions. General Liman von Sanders, military adviser to Turkey, was placed in command and powerful entrenchments were built.

There can be no doubt now that the proper course at this point would have been to abandon the attempt. But operations of war, once undertaken, cannot be broken off without loss of prestige and morale. The War Office, hitherto adamant, undertook to try and make good where the Navy had failed; even though it was realized that the systematic reduction of Gallipoli would need a large army at a time when we could ill afford to dissipate our forces and had far from enough munitions for the western front.

The 29th Division (the last formed from fragments of the regulars) was already on its way. To it were joined Australian and New Zealand troops (the nucleus of the Anzac Corps) who had been landed in Egypt to defend it from Turkish raids, and arrangements were made to send further large reinforcements.

But it was a lengthy business to get all in readiness for such large bodies of troops to land on a hostile shore, and meanwhile Gallipoli was being made more impregnable with each day that passed. Finally, during April, the whole were concentrated in a huge fleet of men-of-war and transports at Mudros Bay in the Island of Lemnos. In the early hours of the 25th the armada sailed for Gallipoli and at break of day the troops landed from boats on the open beach, the Regulars at Cape Helles and the Colonials at Anzac. Lightly held trenches

lining the shore were carried at the point of the bayonet under cover of our naval guns.

This *coup de main* took the Turks by surprise ; but no sooner were attempts made to advance inland and scale the more strongly manned heights, when the fire of our guns were less effective, than a far more determined resistance was met. Time after time did the troops breast the slopes and assail prepared positions. All was of no avail ; the most that could be done was to cling precariously to the ridges first gained.

Nothing in the whole war was more heroic than the conduct of the British troops and the Anzacs, splendid fighters full of courage and endurance, during these assaults where they lost so heavily. The Turk, as he showed at Plevna, is a very stubborn fighter when entrenched. Without an intensive bombardment to beat down opposition by means of heavy howitzers, it was impossible to advance under such a murderous hail. But, even had it been possible to land these, we were at this time desperately short of munitions. There were present only a few light pieces of ordnance, far from enough ammunition and in particular a dearth of high explosive.

This is not the place to describe the operations that followed. It must suffice to say that although we poured in one reinforcement after another, until eventually twelve divisions and a mounted division were employed and largely consumed at Gallipoli, our experience of the 25th April was repeated each time we renewed the attack. The Turks also were reinforced and had both the heavier artillery and the high ground. But even with those advantages they were repulsed with loss whenever they indulged in counter-attack.

A last great concerted effort took place in August, chiefly from a new point of departure in Suvla Bay where the IXth Corps was landed. There were grave errors of judgment, the weather was stifling and water scarce. The first day was wasted, giving the Turks time to rush fresh troops to oppose this new front, and the attempt was a complete failure.

Then at last we began to abandon hope. The troops had lost their first fine confidence. The life blood of Servia had been drained, leaving the way open for heavy German ordnance to be brought to aid the defenders. Most of the small extent of ground we had won lay fully exposed to the enemy's high-sited artillery. It was only possible to land the barest necessities of human life. Dysentery appeared. With the autumn came gales and blizzards from which there was no adequate shelter. Sickness increased and the plight of the troops became daily worse.

Thus matters dragged on their weary course until shortly before the end of the year 1915 when, after a visit from Lord Kitchener, it was decided to cut our losses and give up the attempt.

It was a very ticklish business to get the troops disengaged and safely away where every point of departure was searched by gun fire. While the operation was going on an attack might have led to appalling loss. Many ruses were employed to persuade the Turks not to attempt a sortie. Tents were left standing and movements carried out by night till only a skeleton force remained. Then the last occupants of the trenches were withdrawn and safely embarked, and the expedition sailed to Egypt for well earned rest and recuperation after thousands of lives had been sacrificed all to no purpose in this disastrous campaign.

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Against this grim background we can now sketch in the features of Ordnance work. It can well be imagined that there was no scope for any elaborate organization such as was to be found in France.

Very little was known at home as to the conditions likely to be met, but it was at least realized that a landing would be opposed and that no attempt could be made at the outset to establish an Ordnance depot on shore.

The steamship *Umsinga* of some three thousand tons was therefore chartered and fitted out at Tilbury as a floating depot. As her holds were deep, with only one between deck, an extra deck was built in each, making

four floors all told. In this way, space could be used to better advantage for an assorted collection of goods, any one of which might have to be got at a moment's notice. A plan of each deck was prepared and stores were arranged by sections of the vocabulary, due regard being paid to weight so as to maintain an even keel. Lieutenant Colonel McCheane was appointed C.O.O. with a staff of some hundred and fifty of the A.O.C.

On arrival at Mudros, where the troops were assembling, the cargo was still further adjusted to facilitate work, a travelling workshop was fitted up on the main deck, and a few odds and ends wanted at the last moment were supplied. Here also it became known that two landings at different points were to be made. A second vessel, the *Anglo-Indian*, was placed alongside the *Umsinga* to which part of the stock and a detachment under Major Basil Hill were transferred, so that a store ship should be available at each landing. This operation was carried out during the night of the 24/25th April and on the following day the *Umsinga* sailed for Helles while the *Anglo-Indian* followed up the Anzacs.

On arrival, lighters were placed alongside, loaded in the first place with ammunition, and were towed by naval launches to buoys close in shore. The lighters were then hauled ashore by ropes. Heavy firing was in progress and most of the shrapnel were falling in the water, but the Ordnance parties got through with only a few minor casualties.

It was intended to station these vessels off the two beaches until such time as regular depots could be formed ashore. This proved impossible as the ships were under fire and because the constant shifting of cargo as stores were issued was a responsibility their masters would not face. The *Umsinga* threatened to turn turtle. At Anzac it was only possible to dump ashore such stores as were needed on the spur of the moment. At Helles, where the intensity of the fire was at that time much less, more ample arrangements were possible. Both vessels then sailed for Mudros.

The next idea was to replenish Helles and Anzac by

storeships from Alexandria, where the base for Ordnance supplies was installed. This plan broke down owing to the time taken to trans-ship cargo on to small craft and get it landed on open beaches. The ship was forced to return with much of its contents intact.

It was then decided to employ one of the Islands of the Ægean Sea as an intermediate point of supply from which Gallipoli could be reached by small craft; and Mudros Bay, forty miles from the Peninsula, was selected as the most suitable spot on account of its spacious land-locked harbour. Its shores, however, were shallow and shelving and to build piers and wharves alongside which ocean-going vessels could berth would have been a lengthy and costly business.

With everyone and everything sea-borne this would not much matter and, until after the failure at Suvla, our headquarter staff was very confident. It hoped that we should soon drive the Turks from their trenches when it would be a great advantage to have the main stock of munitions, equipment and clothing afloat all ready to be landed at any point on the Dardanelles or on beyond. The *Umsinga* was therefore kept as a depot ship to feed the beaches by means of ferry-boats plying to and fro.

As more troops and stores began to arrive it became clear that the *Umsinga* was far too small; and, early in July, s.s. *Minnetonka* was chartered instead, the *Umsinga* becoming her ammunition tender. The *Minnetonka*, of 12,000 tons, had been built for the Atlantic trade to carry cattle and a certain number of passengers and was perhaps as suitable a vessel as could be found. She had no well decks and her fore-deck was flush without superstructures.

Nevertheless, for a force that was expanding so greatly and as everything began to assume a more permanent character under the influence of trench warfare, it is impossible to imagine anything more utterly ill-suited for an Ordnance depot than a floating ark. Time and again was the impossibility of running an efficient service from on board ship represented and the creation of a

depot on shore urged. Only in the late autumn were the arguments at last listened to and a proposal made to form a depot on the shore of Kondia Bay next door to Mudros ; and almost immediately after we were considering the abandonment of the whole undertaking.

The *Minnetonka* had not only to furnish everything for Gallipoli. In the course of time large hospitals came into being on Lemnos with rest and reinforcement camps, etc. These likewise had to be provided for through the medium of two small depots on shore, Mudros East and West ; while a third depot was formed on the Island of Imbros where G.H.Q. and its surroundings had their being. There were also calls from the navy to be met from time to time. For instance, 700 survivors of H.M.S. *Triumph* were clothed when she was torpedoed.

With the lower decks of the *Minnetonka* divided into offices, group areas, workshops, armoury, etc., and the upper deck occupied by what was awaiting removal, space was far too cramped to allow of stores being held in any great quantity or laid out conveniently. To get at anything meant plunging into the badly lit bowels of the vessel whose derricks, intended for loading or discharge of cargo in bulk, were ill-adapted for collecting with speed parcels of every sort and kind from all over the interior.

It was utterly impossible to trans-ship into the *Minnetonka* all the bulky stores from out of the cargo vessels that arrived from day to day with supplies for such a large expedition. These boats either tied up alongside the *Minnetonka* or else anchored in the bay while parties were sent off to them at any hour of the day or night to dig out what was most wanted.

Major Man, who was for several months Ordnance officer of the depot ship during the autumn, when the strength of the force had reached its maximum, graphically describes the situation :

“ I remember one day in October when there were well over a hundred steamers anchored in the bay, a dozen of which held stores, ammunition and clothing. We were desperately hard pressed for machine guns which

were being telegraphed for from the front. The bills of lading told us that there were machine guns on board two or three different ships, but it would take weeks to get plans of the holds and find out exactly where they were stowed. Our parties therefore would board a fully loaded 4000-ton tramp steamer and unload on to its deck hundreds of tons of cargo to find machine guns or whatever it might be. After a cargo had been overhauled in this way two or three times one can imagine its hopeless state of confusion.

"Our next great difficulty was due to the service between Mudros and Gallipoli being so uncertain. Stores were carried on the small ferry boats and motor barges (Beetles) which took the troops to and fro. There were all too few of these, often they were too crowded to take everything we had ready, and the service was liable to interruption in bad weather.

"Seldom could we make any definite arrangements in advance. At 6 p.m. we would be told by the naval transport officer that such and such a craft would call at 6 a.m. and lie alongside the *Minnetonka* for 30 minutes to load stores for Helles. All hands would set to and get on deck what was available on outstanding demands from Helles. At 10 p.m. the N.T.O. might send a message to say the boat was to go to Anzac instead of Helles. What had been laid out would be pushed aside and a fresh lot got ready. Then, when at 5 a.m. (instead of 6 a.m.) the ferry came alongside, her skipper would perhaps report that he could only stay ten minutes as he had to push off immediately for Suvla.

"There was no time to clear the deck before a notification would arrive of some fresh departure. Before the end of the year the fore-deck was actually covered to a depth of from six to eight feet with stores which had been laid out for issue but could not be taken and which were so overlaid by later batches that they were never recovered for use and totally wasted.

"The opportunities for theft by Greek and other working parties and by soldiers and sailors were unlimited. After a time convoy-men accompanied consignments and

matters improved a bit. But the unfortunate corporal or private found it very hard to protect articles strewn on the deck of a boat crowded with troops sleeping, sitting and standing, who had no respect for Government property.

"To keep accurate check was impossible and it is small wonder that, when the accounts of the *Minnetonka* were eventually squared up, deficiencies such as 70 Vickers guns and half a million pairs of socks came to light.

"I regard my five months on the *Minnetonka* as a nightmare. We worked as a rule for seventeen or eighteen hours in the twenty-four. The men were cooped up for weeks or even months on board and four of them went mad from overwork and worry."

It is small wonder that Man says a lesson burnt into his brain is never again to use a floating depot to supply a large force. Should this method ever have to be resorted to on a small scale, he notes the following points as of main importance.

Owing to the necessity of being able to get out promptly any individual package, the shafts leading down to the holds and a wide space round them on each deck must be kept absolutely clear. This of course at once lessens by half the capacity of the ship.

Each derrick should be provided with its donkey-engine and should be capable of lifting and lowering a sling straight over the side or vice versa. If stores have to be first lowered on the upper deck and then lifted over the side by a fresh tackle the waste of time is enormous.

Flush decks are a great help. Well decks cause great delay.

It is essential to possess not only the bill of lading of any ship sent out with a reinforcement of stores but also a detailed plan of the vessel showing the contents of each compartment in her holds.

Working for long hours in the bowels of a ship is unhealthy and gives rise to severe mental fatigue. It is

therefore very important to arrange for organized recreation. In the absence of anything better, half an hour with a football stuffed with paper can be indulged in on any deck. Pushing this about with the feet results in a general scrimmage which helps to sweat the irritability out of everyone.

The peculiarity of this theatre, from a supply point of view, is that the lines of communication lay on the high seas. At Gallipoli itself the situation was for some time looked on as so transient that no attempt was made to build up any definite supply organization. Brigadier General Jackson, as Director of Ordnance service, spent most of his time at Alexandria organizing the base which later on became his sole charge while his deputy, Colonel P. A. Bainbridge, was at Imbros, the headquarters of the expedition and not at Mudros, the supply centre.

Only in July, when General Altham arrived as I.G.C., bringing with him from the Southern Command in England his A.D.O.S., Perry, who subsequently became D.O.S. to the force, were efforts made to put matters on a more regular footing. Altham was of opinion that the beaches should be regarded as the railheads of the force and that, as such, they should come under his charge. But to this Corps Commanders objected, claiming that everything landed in their areas was inalienably at their disposal. Indeed seeing that every establishment on shore was practically within the battle area, it would have been impossible for an I.G.C. to control them efficiently from a distant island.

But though Altham did not carry his point, it was due to him that a more systematic organization was built up. An A.D.O.S. was appointed to each zone to co-ordinate, under its commander, all Ordnance work in the area and see that such stores as arrived were distributed to the best advantage among the troops. The beach dumps were converted into depots, organized on the plan of lines of communication establishments. Each was placed definitely in charge of an Ordnance officer, and ledgers were opened so that, in the event of an

advance, the depot could be left behind properly provided for. Better arrangements were also made for combing out salvage from the trenches and sending it to Mudros.

At Helles, as has been said, it had been possible to form a fairly respectably depot from the outset, but at Anzac the position was for long much more difficult.

Moreover, until the end, establishments on Gallipoli were without most of those refinements usually associated with the term Ordnance depot. A rough notebook and a good memory were probably always more valuable than the official accounts which, owing to losses during the evacuation, were perhaps fortunately never called to audit. Stocks were confined to a few items, and when they showed signs of running dry, or if anything extra was needed, a telegram or rough list would be sent to Mudros. Then, after an uncertain period, what was wanted would arrive and be issued through the medium of D.A.D.O.S. either by hand or Indian mule cart, practically the only form of land transport. At other times an Ordnance representative would be sent to the *Minnetonka* to see what useful spoil he could bring back.

All the customary checks were to a large extent waived, both in dealings between the *Minnetonka* and the Ordnance at Gallipoli, and between the latter and the troops. There was no place of safety on the Peninsula for a large establishment and no option but to live a hand-to-mouth existence.

The shortage of munitions has been mentioned. Far more machine guns could have been profitably employed and, until the base at Alexandria was able to mobilize the resources of Egypt, there was a great scarcity of trench mortars, bombs, grenades, sand-bags and all those things wanted in such quantities during trench warfare. There was nothing beyond the ordinary divisional artillery, the largest piece being a 60-pr. ; and the equipment of tools and appliances to keep the guns in working order was poor. Later on the supply of ammunition improved and small reserves were built up. But by then the

Turk had more ammunition and one of the most serious problems was how to store high explosive shell in safety.

When the war broke out Australia was in the throes of forming its own Ordnance department and had been lent the services of Major Austin A.O.D. to assist. Austin sailed for Egypt in December 1914 as D.A.D.O.S. of the 1st Australian Division, having to form his own staff out of untrained men who nevertheless quickly adapted themselves to new circumstances, were as keen as mustard and splendid workers.

Tuckett (an Australian and afterwards Major Tuckett, M.C., M.M.), who was to have accompanied him to Anzac, was ill and had to be left behind at Alexandria, whence he smuggled himself to Gallipoli as a stowaway as soon as he was better. Thus Austin was the only Ordnance representative with the first landing at Anzac. Here he took charge of the reserve of small arm ammunition, occupying himself in getting it up the ridge, and established himself on the beach among the dead and wounded near the small pier at Hell Spit under an Ordnance pennant which, riddled with bullets, now lies in the Australian war museum.

The guns were next got ashore with their ammunition, picks and shovels, etc., salvage began to accumulate and the *Anglo-Indian* arrived. A site for an Ordnance dump was then allotted at Brighton Beach where the A.S.C. supply dump was being formed. Here the Turks gave us twenty-four hours to build a zareba of great-coats and then opened fire from a 4.7 (Beachy Bill) at Gaba Tepe, which dominated the position. In ten seconds, great-coats, picks, shovels, etc., and A.S.C. supplies were dancing skywards. Under cover of darkness what remained was moved to the other end of the beach with the aid of a borrowed cart and mules. Here there was rather better cover, though the site was sniped by sharpshooters and enfiladed by "Anafarta Annie" as well as Beachy Bill. Though shelled practically every day, however, a great wall of clothing gave some protection.

Some Indian troops landed whose only Ordnance

representative was a warrant officer, blown to pieces by a shell the day he arrived. These Austin tacitly took under his wing and, as A.D.O.S. Anzac Corps, he became responsible for all Ordnance services in this sector.

Gradually some degree of order was evolved. Store-tents were pitched, an office was formed and a rough shanty erected as a workshop. Here the dump remained until October when rising tides threatened to wash it away. The landing at Suvla had enabled us to extend our ground along the shore and a fresh dump, the fourth, was then formed beyond the northern margin of the cove. This was more sheltered, there was more room to expand and altogether better arrangements were possible with well constructed trenches and dug-outs as refuge during bombardments. Here also a large cave was discovered in the cliffs capable of holding a good quantity of ammunition.

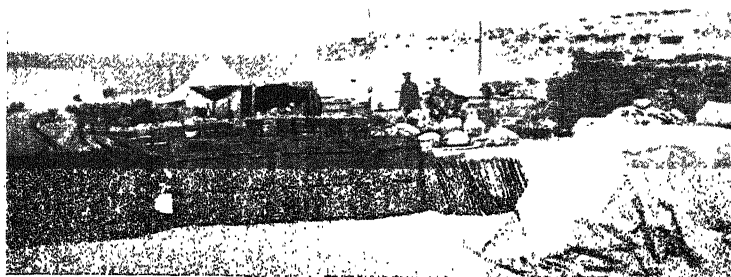
At Anzac our position was but three-quarters of a mile deep, but at Helles the hills debouched further from the shore. The main Turkish entrenchments were on the slopes of Achi Baba (throughout the immediate but unattained objective) which crowned the southern extremity of the Peninsula, and we were able to penetrate several miles inland. On the other hand there was some dead ground under the cliffs at Anzac whereas at Helles hardly any point was safe or even sheltered.

Major Howell Jones accompanied the 29th Division as D.A.D.O.S. to Helles, where the Naval Division also landed with French troops on our right flank. On the following day the *Umsinga* discharged ammunition and a dump was formed at Lancashire Landing, which, though in full view of the guns on Achi Baba, was at least concealed from the Turkish forts on the Asiatic coast. Later on a pier was built, but it was more or less destroyed by every gale.

The Naval Division had its own dump at first. Later on this was merged with the army dump except for purely naval equipment; and eventually all the troops in this sector were formed into the 8th Corps of which Howell



S.S. MINNETONKA AND SATELLITES



ORDNANCE DEPOT, HELLES



Jones became A.D.O.S., having charge of all Ordnance work at Helles.

Captain Gatt of the Royal Malta Artillery was appointed Ordnance officer of the depot which had its small workshop. Deep narrow trenches were built outside the store-tents, offices and living quarters, and by a rigid system of whistles everyone could go to ground in an extremely short space of time. The advantage of this was incalculable later on when the enemy had more ammunition and Lancashire Landing was often shelled continuously night and day.

Owing to the serious shortage of grenades, Major Teale of the Naval Engineers and some men were attached to the Ordnance to run a bomb factory. Luckily there were plenty of detonators and a quantity of N.C.T., and a careful collection of jam-tins and other receptacle enabled a very flourishing factory to be established, capable of turning out large numbers of grenades.

Up to the middle of August ammunition was kept in an old fort near the lighthouse and in dumps on the shore. But the loss of several of these dumps, combined with the near approach of winter, made it advisable to look out for something better. Teale, who was a mining expert, was then employed on tunnelling to make an underground magazine with the aid of miners from various units. Eventually a very fine magazine, provided with a tramway, was burrowed out 70 feet underground, capable of holding in security the 2500 tons which had accumulated by the close of the campaign.

At Suvla, where Lieutenant Colonel Blunt was A.D.O.S. until relieved in October by Lieutenant Colonel Hamilton, we did not land till August. There was much less time to build up anything and arrangements were even more primitive.

The Ordnance headquarters were in a little sandy cove, some 120 yards wide, bounded on each side by steep faces. Beyond was a small plain which only stretched a few hundred yards before spurs and valleys began. The depot consisted of five store-tents, and the dug-

outs used for living and offices were built out of boxes of live ammunition with tarpaulin roofs covered by sandbags. Gun ammunition was stacked in the open covered by bushes. In addition D.A.D.O.S.s had their small dumps, competing for what they could get from this central source.

Hamilton tells a pitiful tale of an early bout of bad weather. "One Friday afternoon we had a bad thunderstorm with a deluge of rain lasting some hours, then gradually, as the rain ceased, the temperature dropped and the wind increased. By the early hours of Saturday morning it was blowing a blizzard with an icy blast. It was bad enough for us in our indifferent shelter, but it meant disaster to the troops in the trenches taken unawares, some sleeping with little on except shirts and overcoats. The first we knew of the state of affairs was the arrival of a continuous line of stragglers returning to the beach in the most pitiable state of exhaustion. The store-tents were emptied, straw was placed in them, and all available stretchers were fetched. Rum obtained from the A.S.C. and boiling water were used to succour the worst cases, but several men died from exposure. Then came the difficulties of dealing with the stragglers who continued to arrive throughout the whole of the next day. Two or three tables were placed on the beach, the bales of clothing were opened, and as the men filed past the necessary articles were issued to each. I think I am right in saying that, roughly speaking, 8000 men were evacuated as a result of this blizzard." Actually the number was more like 12,000.

If for no other reason the Corps did at least earn the gratitude of the troops for having an ample and early supply of good warm clothing landed on Gallipoli. Not often could it experience such a feeling of satisfaction, and for the Ordnance it was indeed a blessing that the wants of the troops were comparatively simple. There were few guns and only of light natures, no complicated types of ammunition, neither side made use of gas, there were no wagons and harness or saddlery to speak of, no great network of intercommunications; a complete

absence of a host of adjuncts such as were to be met with in France.

Suvla, the last point occupied, was the first where evacuation started late in November. Each evening as dusk set in, the troops detailed to embark arrived on the beach with all their equipment. They then quietly boarded the boats ready to take them off to the waiting ships and slipped away in the dark, while the fleet shelled the Turkish lines. Guns, ammunition, stores and clothing were got away simultaneously over a period of five weeks. Everything having been removed in safety, Hamilton with the last men of the Ordnance embarked on the final day, shortly before Christmas.

Early in December the process was extended to Anzac where the operation was carried out in a much less leisurely manner. As soon as the news became known to a chosen few, stocks which were being carefully nursed were freely issued, and every opportunity was taken to send back to Mudros whatever was possible. But it was quickly realized that time would not admit of saving everything, and no bones were made about dumping goods in the sea or smashing them up and emptying drums of oil over clothing. It was, however, strictly forbidden to light bonfires or blow up explosives as this would indicate to the foe what was in the wind. Only when the last of the troops were safely at sea on the 22nd December was what remained of the dump, which by then contained nothing of much military value, blown to glory by the guns of the fleet on the following day.

Not until then was any move made at Helles, where only ten days' notice was given in which to carry out the evacuation. As these crept by the position became very tense with so few left in face of the whole force of the foe. But the Turks made no move and everything went off according to plan. With such a short space of time in which to embark the troops it was not possible to save much else. To avoid sacrificing human lives the magazine and most of the dump had to be abandoned,

though a certain quantity of stores was got away in the boats among the troops.

As usual the Ordnance were among the last to quit the scene. Howell Jones and Teale stayed to fire a mine so fuzeed that the A.S.C. supply dump would go up five minutes after zero hour and the magazine ten minutes later. Teale got away by the last boat waiting on the beach in plenty of time and the arrangement worked to perfection. The A.S.C. dump was seen to light up and before it had attracted the attention of the Turks the magazine blew up. Inspection from a man-of-war two days later showed that the destruction had been complete. That part of the dump over the magazine was completely obliterated and elsewhere the fires were still smouldering. For his bravery in extinguishing a burning limber full of ammunition twenty-four hours earlier Captain Gatt was awarded the Military Cross.

By the 10th January, 1916, the whole of the Corps had assembled at Mudros where twenty-four store-ships were needed to take everything back to Alexandria. Although it had been impossible to save all Ordnance stores it was at least a satisfaction to know that none of military value had fallen into the enemy's hands.

Everyone was heartily thankful when they reached Egypt at the close of this nine months' arduous campaign. The fighting had been desperate and our losses very heavy without anything to show in return. The climate was treacherous—hot in summer, bitter in winter. Accommodation, whether in camp or hospital, was poor and comforts were lacking. There were no facilities for recreation, at Gallipoli bathing was even risky.

A combination of adverse circumstances made it impossible to organize a really efficient Ordnance service; and the Ordnance officer was rarely able to go to sleep with an easy conscience feeling that he had left undone none of those things that he ought to have done. Nothing is more disheartening than to toil day after day and never earn the reward of seeing one's labours bring forth good fruit; and it is therefore the more creditable to find that there was never any friction between the Ordnance at

Gallipoli and Mudros. Each seems to have realized his neighbour's special difficulties and all worked harmoniously together. Although conditions of life were naturally much easier for the A.O.C. than for those in the trenches, in no theatre did the Ordnance share so fully all the hardships of the campaign. In the cemeteries of Gallipoli are the graves of several of the Corps killed in action.

CHAPTER XII

SALONIKA¹

DURING the summer of 1915, the Russian colossus was staggering under a series of blows from the Teutonic Powers, and a defeatist movement was beginning to taint the army. Our operations in Gallipoli were progressing badly, and our attempt to reach Constantinople began to seem doomed to failure.

Ferdinand, the wily King of Bulgaria, influenced by these events, decided that it lay in his interests to enter the lists on the side of the Germanic Powers and, on the 10th October, 1915, declared war against Servia, the small Kingdom on which Austria had forced the quarrel which directly caused the outbreak of war.

In reply, the Allies sent an expeditionary force to Salonika with the object of saving Servia, though it arrived too late to do so. Thereafter, for close on three years, the war in this theatre languished without the opposing troops being able to do much more than contain each other from their opposing trenches.

Nevertheless, if the Allied force could accomplish little in a strictly military sense, its presence influenced the situation in the Balkans politically. Combined with an Allied Fleet at the Piræus it overawed the Greek Government whose King, a brother-in-law to the Kaiser, was intriguing with the object of forcing his country to side with Germany. Eventually, after a revolution at Athens, the faction under Venizelos, who throughout believed in the ultimate triumph of the Allies, got the upper hand, and Greece entered the war on their side in October 1916. Our presence prevented Germany from forming a submarine base at Salonika, and it was one of the factors that induced Roumania to declare war against the Austro-Germanic Powers.

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¹ This chapter is based on a narrative compiled by Brigadier General Usher Smith, who relieved Brigadier General Mathew as Director of Ordnance Services Salonika Field Force in August 1917, and held that post for the rest of the war. For the last portion, dealing with events at Constantinople, I am indebted to Colonel Wortham for details.

From an Ordnance point of view a chief lesson of this campaign is the primary importance of setting to work at the very outset on sound principles, with a site for the future base depot and all its accessories carefully chosen and planned on a scale commensurate with the force to be supplied. The failure, at Salonika, to grasp some idea of what would be wanted resulted in a confusion that it took many months to convert into something like order, during which time Ordnance services were thoroughly disorganized. Seeing that the headquarter staff remained at Salonika, where it was able to oversee the whole situation, this neglect can only be ascribed to there being at first no senior Ordnance officer present with sufficient knowledge of what would be required and of sufficient standing to be able to claim attention to the necessities of his service. Not till January, three months after our first troops arrived, was a Director of Ordnance Services appointed.

Major Bernard Darwin¹, who was present as a temporary Ordnance officer, has written a graphic account of the inception of the depot at Salonika. "There were not enough officers or men," he says, "not enough room, not enough transport, not enough labour and not enough stationery—this last a very important matter when any kind of storekeeping and accounting has to be established. Besides all these deficiencies there was one very serious surplus—mud.

"On the 26th October, 1915, there landed at Salonika two companies of the A.O.C., a small party having arrived a few days earlier from Mudros. This band of pioneers had its mobilization equipment, a little paper, a few pencils and for the moment no great amount of stores. The spot chosen for the depot was on the Monastir Road and here the pitching of tents was begun by the dim light of lanterns on a night of drizzling rain. There were two store tents for each group and the ammunition

¹ Well known as a golfer and writer on that subject. In his few and scanty intervals of leisure he laid out a golf course which was a very popular resort despite the mosquitoes with which it was infested.

was kept under tarpaulins in the open. It soon became obvious that the original site, which only measured about 120 yards by 80, was not nearly big enough, and No. 2 depot, of about the same size, was laid out about four hundred yards further up the road, the two being divided by the then R.E. Base Park. This was something of a buccaneering business since there was apparently no particular authority to allot any particular piece of ground. New claims were therefore staked out with wire stealthily and in the dead of night.

"It was not long, however, before there was another cry for space and General Jackson, who arrived on a fleeting visit from Alexandria in November, decided that a third start should be made on the site of what became the eventual depot, then a bare hillside, some of it recently ploughed, looking down upon a road that was destined after the winter rains to degenerate into a river. The inconvenience of having three depots linked by no telephone and one abominable road needs no emphasizing. The process of moving depots Nos 1 and 2 to No. 3 was necessarily a slow one, and meanwhile stores were dumped at whichever depot best suited the dumpers. Units, informed that what they could not find at No. 1 doubtless awaited them at No. 2 or 3, returned from their quest, sadder, wiser, and muddier. The situation would have been sufficiently trying if it had been merely a question of putting things on a proper working basis before units in any quantity came to draw; but before this could be done there were masses of stores and troops clamouring for them. In November the stores may be said to have trickled; in December they came flooding in at a pace impossible to cope with.

"The difficulties began at the docks. There was practically no wharfage and the sudden inflow of stores was so overpowering that they had to be stacked in the public streets. The strained political situation made things worse, since space near the docks, which would have been invaluable, was taken up by a large body of Greek troops who evinced no desire to make room. The Ordnance staff was far too small and three or four men might

be seen trying to load as many lorries with any stores that came handy, continuously harried the while by frenzied military landing officers. Moreover, apart from everything else, there was the inherent difficulty of troops and their stores being landed simultaneously. This may be illustrated by one example out of many. A ship called the *Stork* contained a cargo of tentage—the actual tents easily accessible, the poles at the very bottom of the hold. The tents were landed, but then the *Stork* had to put out into harbour again to make way for the disembarkation of troops; and so long did she have to wait that in one division the troops cut down trees to make their own tent poles.

“The weather was as bad as it could well be. At the end of November the bitter Vardar wind brought with it a blizzard that raged for three days. Work was practically out of the question, and this incidentally at a time when some of the divisions had no winter clothing. Later again, in December, just at the time when the move to No. 3 depot required the pitching of a number of store tents, a furious storm blew down the tents, exposed the stores to the gale and buried some of them for ever in the mud.

“Such weather, of course, had a disastrous effect on the transport of stores from the docks, which could then only be carried on by road. The road from Salonika to the depot was so bad that a lorry setting out from the docks one day very often did not return till the next, and the digging out of lorries was a common occurrence. As to the roads in the depot itself, they were boggy and foundrous, and many of them of but a temporary character. Where evening had seen a road, morning would find a heap of stores covered with a tarpaulin that had sprung up like a mushroom in the night.

“It was nearly three months before the two main artery roads were metalled, and meanwhile stores could be brought no further than to a transit dump—a most unsuitable spot at some distance from the dock itself and lying at the foot of a long slope down which the rain drained pitilessly. From this dump the stores had to be man-handled, a tedious process aggravated by lack

of labour. There were Greek labourers, but there were not enough of them and the Greek labourer, though he is at his best capable of a certain sullen steadiness of application, can do nothing quickly. He was moreover responsible for many of the losses by theft which for some time baffled all measures taken against them. His weakness for pilfering is ineradicable and his national costume affords almost unique opportunities of indulging in it. Stores disappeared at every stage of their journey from ship to store tent, nor were they safe even there, for the Greeks were not the only culprits; units believed that once on active service there was a community of goods. Though men were detailed to sleep in the store tents and an Ordnance guard was mounted to watch the infantry guard, small articles, more especially of clothing, continually vanished. *Custodes quis custodiet?*

"On the 9th January, 1916, General Mathew arrived as Director of Ordnance Services and it was only during the early months of that year that something like order was gradually evolved out of the chaotic conditions at the base Ordnance depot owing to the bad start made.

"By January 12th, the transit dump, which in December had been one solid mass of unsorted stores, was cleared by heroic exertions. On January 21st the first broad-gauge train brought stores into the depot, and on the 23rd it was first lit by electricity. This last event was really symbolic, for from this time light began to shine through the gloom. The roads improved; Greek labour was more plentiful and was now reinforced by men of the A.S.C. Labour Company, and towards the end of February a decauville railway was laid. It became possible to check and identify stores, to post vouchers—even to take stock. Indents ceased to be scraps of paper in the figurative as well as the literal sense. Although the groups were still far too busy to disentangle old puzzles 'their retrospection,' to quote Mrs. Malaprop, 'was all to the future,' and they had at least time to turn round in and to turn over a new leaf. A sound and proper system of accounting was set upon its legs and remained firmly planted there.

“Once this first winter was passed, the more stirring adventures of the depot may be said to have been over. Henceforth the history of the depot, as regards its ordinary functions, was one of normal and steady expansion, of the running of a machine, well oiled and well guided, which requires no particular comment. Hangars took the place of store tents and everything took on a more durable shape. The shipping staff was increased, a better system of check was introduced and police provided, whereby Greek labourers could be watched and searched, and the losses by theft greatly reduced. Labour difficulties became much less acute. The Greeks were supplemented for a while by Maltese but ultimately were very largely supplanted by Bulgarian prisoners of war, of whom some 630 were employed by the end of 1917. On the whole the Bulgars worked better than the Greeks; they could not be driven but if they were treated in a friendly spirit and given periodical rests they worked on the whole well. They had none of the inborn lassitude of the Macedonian and their fine physique made them very useful in any heavy work. Some moreover were skilled workmen and employed on their respective trades.”

The workshops consisted originally of three light mobile shops which accompanied divisions sent to Salonika; they were installed at the first site selected for the depot and later transferred to the third and permanent site. The equipment of these shops was quite inadequate for a base establishment framed to deal with five divisions, and in November a cable was sent to the War Office demanding some three to four thousand pounds' worth of engines, dynamos and machinery, together with corrugated iron sheds to hold them. The machinery began to arrive in February, but the sheds not till three months later; and it was only then that properly equipped workshops could be constructed and work undertaken in an efficiently organized manner.

Ammunition also formed one of the original groups at No. 1 base depot in October 1915, and shared the vicissitudes of those picturesque and uncomfortable

times. Then, in January 1916, it was decided to form an ammunition depot at the docks, and 26 stone sheds were taken over for the purpose from the Standard Oil Company. There was a pier with a decauville line laid along it ; but the pier was too short and the lighters too often aground, so that the arrangement was very far from ideal.

Next, in the early summer of 1916, it was decided to make a new and larger depot immediately adjoining the store depot. This made it possible to carry on much needed laboratory work for the first time on a proper scale. By the autumn of 1916 the necessity for still further expansion was realized and in October the erection of another ammunition depot of still larger capacity was decided on. This stood on the southern side of the Monastir road, on that unending track of grey-green marsh that stretches away towards Mount Olympus. It was roughly speaking a mile square and had a capacity of 25,000 tons.

Altogether it took long before Ordnance establishments at Salonika fully found their feet, much longer than need have been the case had more foresight been displayed when first we landed. It was not as if experience were wanting. The war had been raging in France for over a year before we set foot in Macedonia, and the heavy rate of expenditure of materiel in modern warfare was not an unknown quantity.

Some delay in building up an efficient organization was inevitable and must always occur in war ; especially where, as here, the expedition was hastily organized, the attitude of the local authorities hostile, and where constructional materials had to be imported and everything created. But even so, to be satisfied at first with such a makeshift and cramped site for a depot was a grave error. A bolder policy would have been more economical in the end, both directly and, by adding to the efficiency and health of the troops, indirectly. The first precious month was wasted and by then the mischief had been done. Stores began to pour in and no arrangements had been made to house them.



GENERAL SARRAIL, IN COMMAND OF THE ALLIED FORCES AT SALONIKA, INSPECTING THE ORDNANCE DEPOT

It is not without good reason that General Usher Smith says the moral of Salonika is "that one should never at the commencement of a campaign be satisfied with a site that is incapable of expansion."

Mathew's experience in France, combined with his bull-dog grit and tenacity which were only stimulated by opposition, soon bore fruit ; and, a state of stationary warfare having developed, Ordnance services were gradually organized on the same lines as on the Western front, though with certain differences in points of detail.

Our lines of communication being short, G.H.Q. stayed at Salonika and the D.O.S. had the advantage of being in close touch, not only with the headquarter staff, but also with the base establishments whose work he and his staff could directly oversee.

But though shallow the zone occupied was comparatively wide. In France a division might hold a front of four miles, while in Macedonia one of the two Corps, the 16th, composed of two British and one Greek division, stretched from Stavros on the sea to Tasli, and thence, following the valley of the Struma, to Lake Doiran—a distance in all of some 65 miles ; and this wide dispersion had its effect on the system of supply.

In France there was hardly ever more than one rail-head for a division, from which all the stores for that division were brought to a central dump for distribution to the troops. The whole of the Ordnance staff within the division worked as one body and for Ordnance supply work the brigade organization was largely, if not entirely, short circuited. But at Salonika, where a division might hold a front of 20 miles, a number of small lines of communication stretched out from the base like the rays of a fan and distribution was on a brigade basis.

In the 16th Corps, for instance, stores for the brigade on the right flank went to Stavros by sea. Then came the Greek division with which we were not concerned. For the British troops next in the line stores travelled by rail to Guvesne, a railway terminus where they were transhipped to lorry or wagon and, after a journey along

the Seres road, reached a decauville railway branching to the right and left through whose means the brigades were reached. Still further to the left the last two brigades were reached via another railhead at Sarigol after further journeys by light railway and road.

This, however, was only after 1916 when a light railway system was laid down at the front. Before then the journey from the broad-gauge railhead was entirely over roads, only two of which were metalled, and the others mere tracks fit only for horse wagons or pack transport, and in bad weather practically impassable.

Thus the system adopted in France had to be modified to suit local conditions ; methods of transport were more varied and difficult and the brigade Ordnance warrant officer was placed in a position of much greater responsibility. He received his stores direct from the base and had his own dump of clothing and equipment from which he distributed to the units of his brigade.

The short distance separating the front from the base encouraged enemy air raids. The docks were attacked in February 1916, but happily an ammunition ship which was unloading at the time escaped. Extensive raids were carried out at Salonika in February and March 1917 under Richthofen, the celebrated German airman. There was however very little loss of ammunition as the storehouses had been cut into the hill and the ammunition was covered by oil tins filled with sand. These acted as bursters for the bombs and cooled their splinters sufficiently to prevent cartridges from being fired.

Captain Donovan's railhead, Janesh, was bombarded in March 1917, when he and two men put out the fired stacks of ammunition under a rain of bombs.¹ Lieutenant Hornan's railhead at Karasuli was raided the following month and this time, in spite of every effort, the ammunition was lost.

To retaliate, Verchoyle Campbell, who was C.O.O. Ammunition, devised an aerial mine, to be fired electrically from the ground, which was sent up in a captive balloon on the Struma front in November 1917. A

¹ Donovan was awarded the M.C. and two D.C.M.'s were given.

German pilot attacked the balloon and when he was distant from it 300 feet, the mine was exploded and the machine crumpled up and fell like a dead leaf.

An important piece of laboratory work consisted in finding a cure for exudation in amatol shell. The method was worked out by Campbell in conjunction with Captain Finch, a temporary gunner officer employed with the Ordnance.¹ It consisted in filling the cavity with molten paraffin wax after it had been cleaned out and the old exploder replaced by a new one.

Another rather unique piece of laboratory work is worth mention. Just on the eve of the final offensive in 1918, the supply of ink ran dry and operation orders could neither be typed nor duplicated. Here Lieutenant Baker, a temporary infantry officer and chemist working in the laboratory, came to the rescue. He obtained blue aniline dye in Salonika and, with glycerine produced at the Ordnance soap factory plus other ingredients, manufactured ink which was sent to the front by motor-car.

Except for low-lying belts bordering the rivers Struma and Vardar, the whole of Macedonia is mountainous, and the positions in which artillery were sited, often accessible only by rugged paths, added to the difficulty of keeping gun equipments in order. Much of the work of inspection and repair, usually carried out at a mobile workshop, had to be effected at the gun position which could often only be reached on foot.

Broken country, bad roads, and a climate hot and dry at one time, cold and damp at another, played havoc with wagon wheels which, by 1917, were being repaired at the base workshop to the tune of 1500 a week. Then, to save the enormous amount of transport needed for their

¹ It was Finch who fired the aerial mine, Campbell being ill at the time. The Ordnance was fortunate in possessing such a distinguished man of science, a Professor of electro-chemistry at the South Kensington College of Science and Technology. Finch is best known for the part he took in the Mount Everest expedition of 1922 when he and Bruce climbed to the altitude of 27,300 feet making a record in the history of mountaineering. Finch received a reward of £200 for his work on exudation, but Campbell's claim was unsuccessful as it was held that work of this nature formed part of the duty of an Ordnance officer.

carriage to and from the front, two Mobile Wheelwright Workshops were demanded from home, one for each Corps; the plant, which included a tyre-heating furnace and shrinking plate, being carried on eight 3-ton lorries, with a staff of 40 men under an Ordnance mechanical engineer. These workshops only came out in July 1918; but they were able to do very good work prior to and during the final advance into Bulgaria.

The nature of the country also led to changes in the scales of transport. Owing to the scarcity of roads and the mountainous nature of the country in Serbia and Bulgaria, wheeled transport could not be relied on. The Greek Army used pack-transport entirely, supplemented by a few two-wheeled carts. To overcome this difficulty, many units were converted entirely to pack-transport. Subsequently, in 1917, there was a conversion from pack-transport to a modified wheel and pack scale, in which all off-horses were equipped with pack-saddles.

The climate of Macedonia is subject to great heat and cold. Malaria was the chief foe and there were few men in the Salonika force who did not suffer from it at one time or another. Anti-malarial measures included the provision of bivouac mosquito nets for all troops in the front line, special nets for circular tents in the base area, and nets for all hospital beds. In addition sentries wore veils with gauntlet gloves and a special pattern of khaki shorts with flaps which could be turned down and kept in place by the puttee in the evening when the mosquito became active.

Credit must be given to the Ordnance in Salonika for success in a high degree in a very useful form of salvage operation on service—the manufacture of soap, which was undertaken on a large scale. Waste fats from rations and the carcasses of slaughtered animals, together with any margarine, cheese, etc., that might be condemned, were collected and a plant erected which made, from these by-products, all the army needed in the way of hard soap, soft soap and dubbin. The output between August 1917 and April 1919, during which time the

factory was in full working order, amounted to one thousand five hundred tons.

Tablets of superfine quality were also made and supplied to the Expeditionary Force canteen; and the French army was only too pleased to patronize the factory, sending in its waste and receiving soap in exchange. Besides saving a substantial shipping tonnage the profit from this plant, which cost only £3000, actually amounted to £36,000 after taking into full account expenses of supervising staff, labour, raw materials and fuel.

Not content with soap making, the idea was extended and a further by-product produced—glycerine, an essential munitions ingredient, of which sufficient was sent home to make up a quarter of a million 18-pr. cartridges.

Conditions in Macedonia, where everything was concentrated in a small area, were more than usually favourable to such an enterprise; and the same may be said of the central officers' clothing depot, whose ledger headings numbered over 700 including ladies' clothing for the nursing staff, and whose turnover in cash amounted, in the last year of the war, to £120,000. This highly popular institution had some very distinguished patrons, such as the King of Greece and later the new King of Bulgaria, the Crown Prince of Servia, Venizelos and the commanders-in-chief of the French, Italian, Greek and Serbian armies in the Balkans. The first issue of clothing to Bulgaria, after the armistice, was made by an aeroplane which carried a parcel to Sofia for King Boris after Ferdinand, the late ruler, had abdicated.

In September 1918 the period of stationary trench warfare in Macedonia at last ended, and events followed close on each other's heels. Our troops were rapidly overrunning the whole of Syria where Turkish resistance was being crushed, the Austrian Empire was disintegrating and Bulgaria was beginning to find it had climbed down on the wrong side of the fence, being the first of our enemies to sue for peace.

The final blow in this campaign was dealt on the

17th September when a general attack was launched on both sides of Lake Doiran. The Serbians and French on our left pressed forward with great success and threatened the Bulgarian lines of communication, and on the 21st September the Bulgars north of Lake Doiran set fire to their dumps and commenced their retreat through the Kosturino Pass to Strumitza, closely followed by our troops.

In these operations six-inch howitzers manned by Greek troops took part, which needed a lot of attention to prevent their breaking down, and the excellent work of the mobile workshops was mentioned in the complimentary orders of the day.

On the 29th September one of these workshops and one of the mobile wheelwright shops had arrived at Kosturino, and by the 30th September it was established at Strumitza with the Ordnance staff and dump of the 16th Corps Troops.

An armistice with Bulgaria was signed on the 30th September; but though this put an end to hostilities it was only the prelude to renewed activity. Mobility was fully restored and great difficulty found in supplying the troops during their advance into Servia and Bulgaria until rail communications were re-opened.

At the same time the work of clearing the old battle area was taken in hand and, by the end of October, 3700 tons of salvaged stores had arrived at Salonika, a very large proportion being ammunition garnered under Ordnance supervision.

During October, most of the troops were withdrawn once more to Salonika with a view to starting operations against Constantinople. These, however, were rendered unnecessary by the signature of an armistice with Turkey at the end of October and the Allies occupied Constantinople without opposition, being supplied with equipment and ammunition through the medium of a dump formed there by the Ordnance officer 12th Corps Troops, which was maintained by sea from Salonika.

It was next decided to send a division to occupy the Caucasus, and a depot, together with a mobile workshop,

was formed at Batoum in December 1918. This had an offshoot still further to the east at Baku which supplied, amongst others, British troops in North Persia, hitherto maintained from Baghdad, supplies being sent across the Caspian Sea. A heavy task in this area was the sorting out of all the Russian military stores and ammunition abandoned after their revolution, what was fit for use being required for the use of anti-Bolshevist Russian troops. The depot remained open till the autumn of 1919, when the Caucasus was evacuated and its contents were sent back to Constantinople.

A neutral zone had been formed by the Allies round Constantinople pending the settlement of peace terms with Turkey, and till the end of February 1919 this area was supplied from Salonika. But we could not prolong our stay in Greece indefinitely. Part of the stock was transferred to Constantinople, part was sent to South Russia to equip anti-revolutionary troops, and the balance either shipped home or sold on the spot to the Disposals Board.

A depot and workshop was installed at Tophane, a Turkish arsenal immediately to the north of Galata Quay, and an officers' shop in the Grand Rue de Pera. Ammunition was at first held in an old Turkish magazine at Bostanjik, five miles from Haidar Pasha on the Asiatic side of the Bosphorus; but in 1921 half was transferred to a depot formed at Yildiz on the European side, a wise precaution in view of the crisis that arose later.

The transfer of stocks from Salonika to Constantinople illustrates once more, if further example be needed, how necessary are intimate relations between the Ordnance and the carrier of its goods. Vessels discharged their cargoes in the Bosphorus into barges which sometimes lay for weeks at the Golden Horn before being discovered, and much went astray. Among missing items, four anti-aircraft guns were eventually located at a Flying Corps depot where they were being used as ornaments for the camp; and it was only the absence of any demands that led to the discovery that a reserve of 10,000

gallons of lubricating oil had found its way by mistake to the A.S.C. depot.

Many troublous years were to elapse before peace with Turkey was at last declared.

The first outbreak at Constantinople occurred in June 1920, when the new National Government at Angora, after presenting an ultimatum, launched three attacks against the Allies which were repulsed with the aid of warships. Meanwhile Greece had occupied Smyrna and penetrated into the hinterland of Anatolia. As a result of these Turkish attacks, the Supreme Allied Council engaged at Paris in putting the world straight, encouraged Greek pretensions in Asia Minor, while a Greek division replaced part of our dwindling force at Constantinople.

The next event was a party revolution in Greece. Ex-King Constantine was recalled to the throne in November 1920, and Venizelos went into exile. The next summer Constantine, anxious to add to his popularity, renewed the war in Anatolia, placed himself at the head of his troops, attacked the Turks, but failed to reach Angora.

Then followed a lull of nearly twelve months, during which the Turks, under the able leadership of Mustapha Kemal, were busy reorganizing and re-equipping their army. They then attacked and routed the Greeks, driving them into the sea at Smyrna. Constantine, to restore his loss of prestige, thereupon determined to attempt, from the European side, the capture of Constantinople, that perennial bone of contention in international politics. This bubble was quickly burst by General Harington, in command of our army of occupation, who threw his troops into the Chatalja lines, a series of fortified posts guarding the land approaches to the city.

Following upon this the Turks, elated by success, determined to try and regain lost territory in Europe, and advanced against Constantinople.

It cannot be said that this recrudescence of war reflects credit on the Supreme Allied Council which, by

its vacillating policy, first supported Greece under Venizelos, a pro-Ally, and then deserted her under Constantine, a pro-German; and which, even at this serious juncture, could not agree on a common line of conduct. France and Italy refused to defend the neutral zone. France indeed, anxious to establish good relations with Turkey, had supplied her with those munitions that enabled her to renew the war. We alone, with the few troops still left, barred the way.

Almost it seemed as if we were about to undertake single-handed a new war on a large scale. Our troops were concentrated round Chanak, on the Asiatic shore opposite Gallipoli where, having command of the waterway, they threatened from a flank any attempt by Turkey to throw troops across the Bosphorus. Certain regiments were brought up to war strength and sent out from England, making the force equivalent to about a division. Reinforcements of munitions, etc., were hastily collected and despatched, and the strength of the R.A.O.C. under Colonel Wortham was brought up to 25 officers and 250 other ranks.

Constantinople now lay in the projected line of advance of the Turks. Its stocks were withdrawn and a fresh Ordnance depot was formed at Kilia, half a mile from the coast of the Gallipoli peninsula opposite Chanak. A regular war supply organization was re-introduced, with a D.A.D.O.S. whose dump was replenished by barge or launch across the Narrows.

For long the situation remained critical, and it looked as if a renewal of hostilities was almost inevitable with the rival forces glaring at each other at such close quarters. But eventually the tact of Sir Charles Harington, who proved himself as able a diplomatist as a soldier, won the day and the tension gradually relaxed.

Thus matters drifted on for the space of nearly twelve months longer while fresh peace negotiations were in progress, which resulted in Turkey regaining Constantinople and much else she had lost. Only then, in October 1923, did the R.A.O.C. with the last of our troops sail home.

CHAPTER XIII

PALESTINE

THE account which follows is taken from a narrative compiled by Brigadier General P. A. Bainbridge, Director of Ordnance Services with the Egyptian Expeditionary Force who, in a prefatory note, states that "acknowledgments are due to Major R. J. L. Bashford, O.B.E., R.A.O.C., who, since 1917, has been engaged in the task of collecting and classifying information, and who is therefore largely responsible for the text."¹ Subject to slight abridgments and rearrangements which, by preserving the chronological sequence, make it easier for one who was not present to follow the flow of events, the original text has been preserved.

The campaign had three phases. In the first attention was concentrated on the Suez Canal itself, a factor both of weakness and strength. Its weakness lay in the necessity of defending it at almost any price owing to its immense importance as a channel of communication with India and the East. Its strength lay in its serving as a natural obstacle to an attack on Egypt. The year 1915 was occupied in defensive measures; in warding off attacks across the Sinai Peninsula against the Canal by Turkey aided by German efficiency, and in opposing raids by tribesmen on the Western frontier of Egypt. For this stage the ordinary peace depots of our Army of Occupation in Egypt, at Cairo and Alexandria, sufficed.

During the second defensive-offensive period in 1916 the defence of the Canal was carried out from its far side, the Turks in the neighbourhood were defeated at the battle of Romani, and our outposts pushed across the Sinai Peninsula, over which a railway and water supply was laid. At this time the new war depot installed at Alexandria became the base for Ordnance services through a chain of depots on the Canal.

¹ Major Lindsay Bashford had served on the staff of the New York *Sun* and as literary editor for Lord Northcliffe. His death soon after the war cut short a promising journalistic career.

In 1917 the operations assumed a thoroughly offensive character. During the spring were fought the first and second battles of Gaza which we failed to capture largely owing to transport and water difficulties. Then, in June, Sir Edmund Allenby was appointed Commander-in-Chief and the force increased to seven divisions and three mounted divisions. In the autumn Gaza was taken, Jerusalem fell and, a year later, the whole of Syria was over-run and the remaining Turkish forces routed. During this third phase the large and important new depot at Kantara, on the east bank of the canal, with Alexandria to support it, served as the base for Ordnance supplies.

* * * * *

The Suez Canal was the scene, in the early weeks of 1916, of a notable military expansion.

To this desert area, admirably suited for the purpose—with a sparse population, wide empty spaces, healthy and dry climate and a lateral railway system from one end of the Canal to the other—troops thronged in the beginning of 1916 from the Gallipoli Expedition to be reorganized and re-equipped. They were joined by new drafts from Australia and India, together with other units destined to carry out the plan, soon decided on, of invading Palestine. Over and above this process of reorganization, an elaborate system of Canal defences was completed along a line roughly seven miles distant from the Canal itself; and various mobile columns were equipped for strategic enterprises in the Sinai Desert, among them the force that undertook, in August 1916, the Romani-Katia operations, the first stage in the advance towards Palestine.

These developments involved the re-organization of the older, and the equipping and moulding together of the newer, Australian and New Zealand troops. To cope with the situation, a chain of closely cooperating Ordnance depots was established at Port Said, Ferry Post (Ismailia), Suez and Tel-el-Kebir. Manned chiefly by A.O.C. personnel who had been through arduous months in Gallipoli, these Canal depots got quickly to work and did

good service during their career. The depot at Ferry Post may be held the first attempt at the construction of a workable field depot when the only available assets were a patch of sand, an existing or projected railway siding and a length of road ; when, too, the length of life of a field depot, and its expansion after establishment, could not by the very nature of the circumstances be estimated.

As autumn approached the situation rapidly changed. The fighting force moved eastwards steadily towards Palestine, to ensure the defence of Egypt from the Palestine frontier rather than from the Canal. The Ordnance Canal organization sufficed to meet the requirements of this advance. The battle of Romani was fought in August. After a period of further preparation, and to admit of the development of the desert railway, a further advance was made against somewhat spasmodic opposition. El Arish and Rafa fell. The Turks fell back on a chain of strong positions based on Gaza and Beer-sheba. The desert railway pushed steadily onwards to Khan Yunus and thence to Deir-el-Belah. The line of communications was steadily lengthening and it had become evident that an expansion of Ordnance organization was urgently necessary. This was provided for by the establishment of a depot on the east bank of the Suez Canal at Kantara, the starting point of the desert railway.

It may be fairly said that the scope and method of Ordnance activity with the invading forces of Palestine and Syria were focused and reflected in the uninterrupted development of the depot at Kantara, of which Lt. Colonel Hay was in charge. There each fresh demand made on the resources of the Ordnance with the Egyptian Expeditionary Force was, in one way or another, recorded. A bare patch of sand in 1916, in a particularly ugly and desolate place, this highly organized depot before long covered over sixty-five acres.

One of the most remarkable developments in this theatre of war was indeed that of the purely military station of Kantara, equivalent by December 1918 to

a town with a floating population of over 100,000—with wharves on the Suez Canal capable of receiving ocean-craft, with an elaborate and admirably arranged terminus to the desert railway, with many broad and well-laid roads, with a busy organization of hospitals, camps, depots, canteens, institutions, administrative offices, by-product factories—and finally the Canal bridge which now, through Kantara, links up directly Egypt with Palestine, Cairo with Jerusalem, Africa with the East.

In this big busy city the spacious Ordnance depot played no small part. Its personnel increased steadily until in 1918 it exceeded 3000, and its responsibilities were increased when stores from England began to arrive direct, instead of all coming from the base at Alexandria.

From Kantara, throughout the spring months of 1917, there came a steady flow of stores to a chain of Ordnance railhead posts where stores were taken over by Ordnance representatives with the troops for distribution. With this development, and as troops were concentrating on, and eastwards of, Kantara, so did the importance of the original Canal depots diminish. The war had left the Canal behind. Effort was now centred on Palestine. The depots at Suez and Port Said became little more than transit stations, although the former continued the shipment of stores to the Hedjaz. The depot at Ferry Post continued to equip fresh units but on a much smaller scale. Kantara absorbed personnel from every available source.

The chief difficulty had always been the Canal itself. In earlier days, stores coming to Kantara by rail had necessarily been off-loaded on the west bank of the Canal and transferred to the Ordnance depot on the other bank by motor lorry or wagon. This involved labour, delay, and danger of loss or damage. It now became imperative to relieve the Egyptian State railways of the very great strain upon their resources in the carriage of Government stores, so as to release more rolling stock for use on the Palestine railway. Arrangements were therefore made to send Ordnance stores from Alexandria to Kantara by water in ships or lighters. This involved many

changes at Kantara. Wharves had to be constructed on the east bank of the Canal; railway sidings had to be considerably extended. The transport of stores from the base by sea was begun in August and was working well by the late autumn despite some difficulties.

The summer of 1917 was a period of expansion in men, arms, guns, transport, aeroplanes, ammunition, hospitals, and indeed, in all the varied organization of a mobile fighting force. The line of communications was longer and there was an increase in every branch of Ordnance work. New A.O.C. Companies arrived, new mobile workshops were formed, and by the end of the year the strength of the Corps was double what it had been at the beginning.

At this time the Turkish army in Southern Palestine was holding a strong series of positions, extending from the sea at Gaza roughly along the main Gaza-Beersheba road to Beersheba. The enemy's force was on a wide front, the distance from Gaza to Beersheba being about 30 miles, but his lateral communications were good and any threatened point of the line could be very quickly reinforced. The channel of Ordnance supply was now through Kantara by the desert railway to El Arish and Deir-el-Belah, and on the Beersheba branch line through Rafa to Shellal.

In the beginning of May the small railhead post at El Arish had been expanded into an advanced depot and workshop. The plan was that it should hold a month's stock of those stores which Ordnance officers attached to divisions were entitled to demand "in bulk"; that is the principal items most urgently and often required by troops during operations. During this summer the scale of bulk stores received some useful additions. It seems indeed advisable, on Egyptian experience, where advances were rapid and units apt to become widely separated, to make the scale on which Ordnance officers with formations may demand stores in this way as generous as possible.

From this depot, too, were outfitted various small but none the less useful expeditions which, during the

period, went out into the desert for various purposes. Important reserves of stores were assembled in view of impending operations, more especially in connection with the large expansion of hospitals which took place in the late summer. The construction of a Mobile Composite Force in August is an interesting illustration of the variety of Ordnance work. This Force consisted of an Indian cavalry squadron, Indian infantry and French and Italian contingents. The signal company was formed from Indian units, and the field ambulances were a French, Indian and Italian combination.

But, as the autumn approached and the demands on the railway increased, it was decided to forward stores direct from Kantara to railheads. The depot at El Arish was then closed down and the greater part of its personnel sent forward to form emergency stocks at Deir-el-Belah, the terminus of the light railway which carried supplies to our troops holding the position confronting Gaza.

Hand in hand with the general expansion during this summer went that of ammunition supply. In the spring, the chief ammunition magazines were on the Suez Canal. Gradually stocks were concentrated nearer the scene of operations and extensive magazines were constructed at Rafa and El Arish. These advanced magazines were designed in splinter-proof bays, constructed of timber and sandbags ; and, as regards storage capacity and level of temperature in a hot climate, they proved satisfactory. Among other services the Royal Flying Corps were provided with 4·5-inch shell specially adapted for dropping from aeroplanes.

Arrangements for the supply of Ordnance stores for the initial stages of operations were now complete. Simplified by the elimination of the El Arish depot, the current of supply passed directly from Kantara to Deir-el-Belah, covering the left wing, and to Shellal covering the right wing ; certain stores which it was judged might be urgently needed during operation being held at each place. The bifurcation of the railway was at Rafa, where further reserves of various kinds were held and

where large quantities of stores were daily handled in transit.

In pursuance of the policy of carrying out as many repairs as possible, as near as possible to the troops, Ordnance mobile workshops had been duly allocated. On the left wing, confronting Gaza, a medium workshop was placed capable of dealing with heavier calibre guns ; and here also were posted light workshops, a corps armoury and many tradesmen, such as tinsmiths who repaired large numbers of fanatis (portable water tanks). Other shops and armouries were stationed to cover the line as far as Shellal. Behind all stood the big workshop at Kantara. It is safe to say that throughout the first stages of the campaign in Palestine no battery had a single gun out of action through mechanical defects.

The fighting force, at the commencement of the autumn operations of 1917, had reached a strength of some 249,000 British and 18,400 Indian troops, with 80,000 Egyptians and 140,000 horses, mules and camels.

The bombardment of the Gaza defences commenced on October 27th, 1917. The attack on Beersheba began on October 31st. Jaffa fell on November 16th. Jerusalem surrendered on December 9th.

The dates and the map show the rapidity of the advance. Nor did operations stop at these successes. Action was at once taken to establish a front line well to the north of these places, in order to secure lateral communications from east to west, to work into and across the Jordan valley, and to establish contact with the Sherifian troops—Arab tribes who had revolted, and with Lawrence's guidance, were raiding Turkish posts on the railway to Mecca on our right flank.

A period of extreme strain on the Ordnance organization followed upon this rapid advance. The troops had moved far more quickly than the broad-gauge rails could be laid down, and difficulties were increased by the fact that the weather had finally broken. The hint of rains which had caused forebodings at Gaza was borne out by a succession of storms of increasing severity in December

and January. The bad weather caught the troops, largely fresh from the heat and dryness of the Egyptian desert, either upon the moist foot-hills of the Judæan mountains, where torrential rains speedily converted whole areas into swamps, or amongst the arid and bitterly cold mountains themselves. It is difficult to conceive more exacting contrasts for an army, of climate and country, than those imposed by this rapid advance with its extended line of communications from Egypt to, let us say, Jerusalem. The operations added, too, to the wear and tear of many stores—for example, boots, clothing and wheels; the needs of the army were in fact most pressing just at the time when it was most difficult for supplies to reach it. For instance, one division started in the desert with khaki drill and ended up in the mountains similarly clad. Its winter clothing had to be left behind and considerable delay was inevitable before it could be sent forward once more.

To cope as promptly as possible with this difficult situation an Ordnance depot was established in December at Deir Sineid, where the broad-gauge railway linked up with a section of the narrow-gauge Turkish line running northwards to Junction Station.

Immediately afterwards a railhead Ordnance post was placed at Junction Station whence the captured Turkish railway system extended northwards to Ludd and eastwards to Jerusalem. The Turkish system was not, of course, immediately available, but every effort was made to bring it into action as soon as possible. Meanwhile the broad-gauge railway was pushing steadily forwards towards Ludd, where an important centre was to be formed.

The channel of Ordnance supply had thus been very simply adjusted. Stores were forwarded by broad-gauge to Deir Sineid and thence by the Turkish line, or they would be fetched by convoys of various kinds sent in direct from formations.

The life of the depot at Deir Sineid, though busy, was however but short; for it soon became evident that the real pressure would come well to the north. Steps were taken to obtain a spacious site for a depot at Ludd

and to arrange for the necessary railway accommodation. As soon as the broad-gauge railway reached Ludd the transfer of the Deir Sineid depot to that place was taken in hand. On January 29th, 1918, the laying out of the Ludd depot was begun. The transfer was carried out in carefully planned stages in order to avoid, so far as possible, dislocation of work at this very difficult time. On March 17th the Deir Sineid depot closed down and on the following day the Ludd depot opened.

No sooner were these operations over than a salvage organization was set to work in the area over which the troops had advanced, where large quantities of stores, enemy and other, had accumulated at various points.

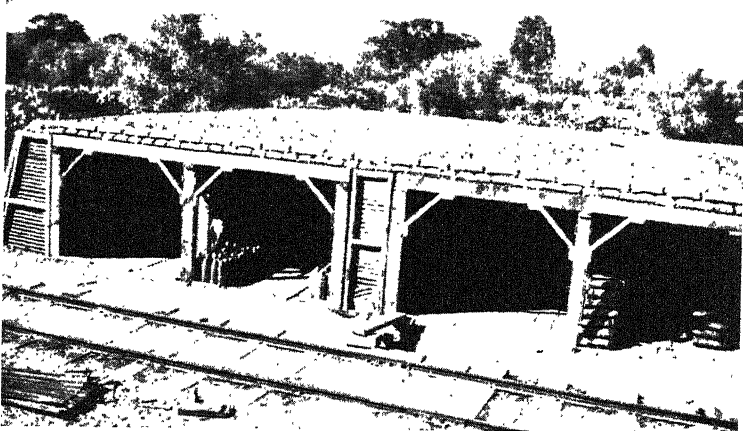
Salvage increased rapidly and many thousands of sacks of sorted stores were sent down the line. During December and January over 10,000 rifles were collected, while old boots were retained for repair by advanced parties of bootmakers, whose work was very valuable owing to heavy wear of boots in the bad weather and hilly country.

On the occupation of Jerusalem, the railway station was found to be very roomy and in fairly good condition, whilst the section of the line between Jerusalem and Junction Station was the best constructed portion of the Turkish system. A quantity of technical stores was found, plant, tools and metal of various kinds. In the goods shed the Ordnance railhead post was established, and sidings duly repaired.

Those who saw Jerusalem in the first weeks after the flight of the Turks will not soon forget the appearance of the liberated city with its closed shops, the utter absence of industrial and social life, and its pallid and furtive population. The change began immediately. On the railway, busy forces were at work repairing crippled rolling stock, laying down sidings, cleaning buildings, overhauling plant. In the city, order and safety of life and property were established, sanitation and a water system were begun. Ordnance workshops in various places were taking over factories and plant, and drawing in skilled and unskilled labour. Food was poured into the



ORDNANCE DEPOT, KANTARA



LUDD AMMUNITION STORE



city for free distribution through the Syria and Palestine relief fund to the hungry and poverty-stricken population.

The year which elapsed between the occupation of Jerusalem by the British and the end of the war brought about a revival in that city in every branch of social and economic life, which will always remain a tribute to the energy and justice of British administration. It is satisfactory to reflect that in this the Ordnance organization was able to help. Before long the greater part of the Ordnance coolie work in Palestine was done by the inhabitants of the district; and there can be no doubt that the remunerative employment of local labour by army departments and others contributed materially to the improvement in stamina and the increase in content which became so generally noticeable in Jerusalem during March and April 1918.

With a railhead depot at Jerusalem it was possible to meet the requirements of the right wing, while the organization at Ludd was rapidly developing. Finally plans were laid down to carry the broad-gauge up the mountains to Jerusalem itself, thus enabling the last fragment of the Turkish system to be dispensed with.

Already in 1916 Ordnance stores, including guns and ammunition, had been sent from Alexandria to the Hedjaz through Suez. During the following year the quantities of stores sent to this destination increased until they assumed considerable value. Not only were captured Turkish mountain guns, German machine guns, Mauser rifles, and ammunition sent down the Red Sea to the various sea ports feeding this campaign, but also considerable quantities of our own equipment; in fact everything necessary for the prosecution of a desert campaign.¹

¹ When Yenbo, a Red Sea port opposite Medina and the base of the Arab revolt until it moved northwards, was abandoned, "two armourer sergeants were left behind with some heaps of broken weapons and thirty sick and wounded Arabs. The armourer sergeants, finding things boring had dosed and healed the men and mended the machine-guns and combined them into a company. The sergeants knew no Arabic, but trained the men so well by dumb show that they were as good as the best company in the Arab army." *Lawrence and the Arabs*.—Graves.

The spring of 1918 brought changes which profoundly modified the general situation and led to a complete re-organization of the fighting force. The strained situation that was developing in France, owing to the collapse of Russia, made it necessary to reinforce the Armies there as heavily and quickly as possible. For the time being all forward movement ceased in Palestine, British divisions were sent to France and replaced by units drawn from India and other theatres. An extensive re-organization of this nature, introducing large numbers of troops of a different nationality, with different scales of equipment, different clothing, different methods of transport—a hundred differences of detail in fact—had to be arranged for ; and temporary depots were established where the equipment of units leaving the country was adjusted to the French scale, and that of those arriving in Palestine to the scales found to be best suited for work in that country and climate.

It was to meet the requirements of Indian units arriving in Egypt that a depot had been opened at Tel-el-Kebir. The work was sufficiently onerous, for it must be recollected that not only were Indian line battalions arriving from Aden, Mesopotamia and India, and Indian cavalry from France, but the reconstruction of the fighting force involved the equipment of units of very varying character. Moreover, many of the units from India arrived without camp equipment or rifles and the job had to be at once undertaken of equipping and preparing them for a campaign under Egyptian conditions.

As time went on, however, it became clear that the utility of the depot at Tel-el-Kebir had passed. The back of the work was broken. The machinery was working smoothly up the line. It was therefore decided to close down Tel-el-Kebir depot and to concentrate upon Kantara the work of supplying the needs of these Indian units. Some Indian Ordnance personnel was available for this task and did much useful work.

The stately advance of the broad-gauge railway from Kantara was throughout a controlling factor of Ordnance policy in the Palestine and Syrian campaigns. It led

in the first place to the siting of a depot at El Arish, then to its abolition and replacement by one at Deir Sineid, next to the opening of a depot at Ludd, which was enabled to start life on March 18th 1918, fully fledged, by taking over the stocks and staff of Deir Sineid. We may picture this field depot in its grove of olive trees, with its lengthy sidings and extensive compound working at full pressure throughout the spring and feeding the right wing at Jerusalem. The staff of native labourers at Ludd depot exceeded 1000, including women engaged for tent repairing.

The Ordnance depot at Ludd was also linked up with a small Turkish light railway system working westwards and northwards to Jaffa, where the XXIst Corps had established baths for troops, a clothing disinfecting station, and a laundry and repair shop.

At this time however, owing to the complete change in the general military policy (and partly to the fact that the enemy had brought up long range guns), it was decided that military commitments in the Ludd organization were too heavy. One of the steps resolved upon was drastic reduction in the Ordnance depot. In order to avoid dislocation of supply the breaking up process was necessarily slow, and later on a good deal of work devolved upon Ludd in connection with transit of stores and the handling of salvage, whilst the workshops remained busy, and it was not until February 1919 that it was found possible to bring Ludd down to the scale of a railhead post only and to evacuate the last of its workshops.

Meanwhile, significant developments of the broad-gauge railway had taken place. On June 15th 1918 the first through train ran from Jerusalem to Cairo. The broad-gauge railway had thus climbed the mountains to Jerusalem itself and the Suez Canal had been bridged.

Thus it happened that for the final operations the Ordnance organization had been still further simplified. Kantara was now the only Ordnance depot feeding the fighting force, and the channel of supply passed from there direct to railhead posts at Ludd and Jerusalem. Although the distance from the depot to the troops it

was supplying was so great, the increasing efficiency of the railway and the elasticity of the Kantara organization enabled a steady supply of stores to be maintained.

The change of policy of the spring practically establishing, at least for a time, a stationary front, coupled with the fact that as a source of urgent supply Kantara was far away, made it advisable to arrange a new grouping and strengthening of the Ordnance mobile workshops. To simplify provision, distribution of spare parts, materials, etc., three chief groups of shops were formed, focused upon Jaffa, Jerusalem and Ludd. All indents for stores required by outlying shops were sent to these centres where considerable reserves were established and large quantities of stores for exchange against unserviceable—such as gun and vehicle parts, fanatis, etc. Boot-makers were brought up to deal with the very heavy repairs which the conditions of weather and country rendered urgently necessary. Thus these shops became in a sense technical depots, and under this arrangement repair work of many kinds was kept up to date and carried out with the minimum of delay.

The autumn operations of 1918 commenced on the night of September 18–19. On the night of September 30–October 1st Damascus was occupied. Beirut fell on October 6th, Tripoli on October 13th, Aleppo on October 26th. Four days after the occupation of Aleppo the Armistice with Turkey was signed. The Armistice with Bulgaria had been signed on September 30th, that with Austria was signed on November 4th and that with Germany on November 11th.

In 47 days the fighting force in Palestine had advanced 300 miles, had destroyed three Turkish Armies, and had captured 75,000 prisoners and 360 guns. The workshop groups at Jaffa and Jerusalem broke up directly the rapid advance of the troops made it necessary to send mobile workshops forward, and Jaffa and Jerusalem passed out of the picture.

Again, as in the Jerusalem campaign, so in that of Syria, the troops ran away from the railway and the same difficulties of supply speedily presented themselves,

These operations, indeed, had begun a month earlier than those of the previous year and in consequence the weather held fine and wear and tear of clothing was notably less. But, on the other hand, the advance was more rapid, and covered much more ground. It soon became necessary to establish connection with the advancing troops by sea working through the various ports—Haifa, Beirut, Alexandretta, Mersina—as they were successively occupied. This system was set in motion as expeditiously as possible. For some time, however, the problem, especially for divisional Ordnance staffs, was no easy one; they were left with quantities of important stores in the middle of Palestine, and quite out of touch with their troops; these stores had to be returned down the line to Kantara, and it had to be decided which should be sent up by sea to Syria.

In this ticklish business the Kantara depot co-operated and, with its outpost at Port Said, organized shipping. In September, 7300 tons of stores were sent forward by water. Until the cessation of hostilities shipment to the coast ports took place from Kantara direct. Later, to avoid the heavy Canal dues, stores were sent from Kantara to Port Said by barge and forwarded on to Syria by steamer, a regular service being established.

Considerable difficulties were encountered during this process. Having regard to the necessary preference given to foodstuffs and forage, there was generally insufficient room for Ordnance stores. On the other hand, when cargo space became available, it was found unavoidable to send up quantities too large to be conveniently handled at these crowded advanced posts by the small Ordnance organizations. If a system of this nature is to work well frequent small shipments are essential; but in this case it was many months before this could be arranged. Moreover losses on shipboard were excessively heavy as no responsibility was accepted by the shipping authorities.

Salvage in the Syrian campaign was more fully organized than had been the case in the previous autumn, and despite the fact that the quantities of captured

stores of all kinds were enormously in excess of all anticipation, the arrangements proved capable of coping with all emergencies. Advanced areas were at first under Corps administration and it was under Corps orders that the preliminary search for and collection of salvage took place. Divisions sent out parties to search areas allotted to them and these parties marked their discoveries on the 1/40,000 map, which, when completed, was sent up to Corps headquarters. Thus a blue circle indicated a discovery of gun ammunition, a red circle of small arm ammunition, a green circle of bombs and a yellow circle of other war material. An approximate estimate of the size of the discovery was given by figures within the indicating circle. These discoveries were then brought together and concentrated in central dumps for subsequent disposal. It thus became possible gradually to obtain some idea of the immense quantity of captured stores which would have to be handled.

As the advance continued the Corps areas were pushed forward and the areas thus left behind passed under the administration of Palestine line of communications, whose authority by the beginning of 1919 extended as far as Haifa and Damascus. The authority administering the area sent in salvaged stores to railhead posts where salvage was sorted out under Ordnance supervision and forwarded to Kantara or Alexandria.

Concurrently with this organization over the immense area of enemy territory now occupied, went the work of collecting and caring for prisoners of war and refugees. Transit camps up the line had to be furnished, and difficulties were increased by the poor physical condition of the majority, so that very extensive hospitals had to be equipped, for it is no exaggeration to say that 75 per cent of those captured had to be given medical attention.

The rapidity of the advance into Syria and the exceptionally difficult conditions of transport and supply have already been indicated ; but a recapitulation of the situation must be given here in order to explain the work undertaken in Syria itself. Our view must now pass beyond the initial battlefield and salvage areas to the wide

front in Syria along which, following a policy of incessant movement, the cavalry divisions were quickly advancing. It became increasingly difficult to know where to send stores. Transport had been left behind, units had shed nearly everything, and many of them may fairly be said for some considerable time to have been living on the country.

Yet certain Ordnance services for these troops became urgently necessary ; as, for example, the supply of winter clothing, blankets and tentage. At first, indeed, it seemed as if, before one such service could be completed, others would become equally urgent, and that, with units covering the entire area along the coast and inland from Damascus to Aleppo, it would only be possible to serve conveniently such troops as happened to be in reach of sea ports. Only very limited quantities of Ordnance stores could be sent up in the supply ships, priority must be given to the most urgent of these and it was by no means easy to decide what, under widely different conditions, might be most needed. Close co-operation was necessary at this time between general headquarters and Kantara, the latter reporting shipments daily and receiving detailed instructions as to what and where to send. On one occasion a consignment of horse-shoe nails was despatched by aeroplane.

Gradually the situation became clearer and a chain of Ordnance posts, extending from Haifa as far as Mersina, was established. These posts speedily got to work and before long were being fairly well supplied by means of a fleet of eight vessels plying regularly from Port Said. The Ordnance post at Haifa was opened on October 1st 1918, Damascus having been occupied during the preceding night. Soon unserviceable stores were being poured into the sheds which had been allotted for Ordnance services at Haifa from units moving still further northwards and to these were soon added captured guns and limbers. Haifa was of importance as being the terminus of a Turkish light railway system leading to Damascus. At Damascus connection was made with a line passing through Rayak to Beirut. This narrow-

gauge system covering a very wide area was of considerable value. At Beirut shipping difficulties were encountered owing to the limitations of the harbour and the shortage of lighters, but the Navy gave valuable assistance, especially in providing drifters for dumping derelict ammunition at sea. At Alexandretta, on the other hand, there was a plentiful supply of surf boats. This post was established on December 1st 1918, working hand in hand with the Ordnance staff of the Fifth Cavalry Division and employing Egyptian Labour Corps coolies. Amongst the jobs undertaken at Alexandretta was the distribution of camp equipment and clothing for over 4000 repatriated prisoners of war, British, Indian and Serb; whilst the French and Italians sent up clothing for repatriated prisoners of their own nationality. At Mersina work was carried out on lines similar to those of the other advanced posts.

The area of supply had become extremely wide and the means of access to it still remained very slender. In this respect, and in relation to the great distance of the most advanced distribution posts from their bases of supply, probably the only parallel during the war has been Mesopotamia. There, however, a channel of supply by river offered different problems, technical and other, to those of a service across three countries, differing greatly in nature and climate, fed mainly by one slim line of rails.

With the small advanced Syrian posts, resting on Kantara for their supply by rail or sea, and in good working order in the early weeks of 1919, we may fairly consider that the expansion of the Ordnance organization with the Egyptian Expeditionary Force during the war had reached its climax.

Although certain forward movements continued to take place in the northern area, this period was one of concentration rather than expansion. Troops were returning to their bases; the processes of disbandment and demobilization had begun and were soon to present an array of new and complicated problems. Decisions had to be arrived at as to the size, nature and distribution

of the forces to remain in this theatre of war and the organization necessary to meet their requirements. But while the future of Syria and Palestine, and the distribution of control between the French, British and Arabs remained uncertain, it was difficult to push forward with fresh arrangements, and these matters of high policy remained to be decided at the Peace Conference to be held at Paris.

Moreover, when considerable progress had been made and the scope of the Army of Occupation was more or less fixed, the work of rearranging the military organization was rudely interrupted by violent revolutionary disturbances which broke out throughout Egypt in the spring of 1919. Confronting these events, it was clearly impossible to work down at once to the scale of the proposed Army of Occupation. The measures taken to cope with the emergency practically involved the establishment of an Interim Army. Troops had to be distributed throughout the whole of Egypt. Railways had to be patrolled. Demobilization was stopped. Many urgent issues of equipment, arms, tentage, etc., had to be made. Mounted columns had to be got ready at practically a moment's notice. Units which had already handed in stores preparatory to embarkation for home had to be re-equipped for their new tasks, in some cases—and even by night—taking off the dump the actual stores they had just handed in. Amongst emergency work done at this time was the mounting of Stokes mortars on motor-lorries and in Nile boats for use against revolutionaries.

The military administration of Egypt and the occupied territories was now re-organized. G.H.Q. returned to Cairo, and in the beginning of May, Palestine lines of communication died a natural death. 'Northforce' was formed with its headquarters at Haifa to exercise military administration over Palestine, Syria and Cilicia. In Egypt military administration was similarly centralized and 'Headquarters Egypt' were established at Heliopolis, near Cairo. Each of these two main commands was divided into divisional areas, to conform with which Ordnance services were reorganized also. Kantara

continued to meet the needs of Palestine and the forward areas, and also of a part of Egypt, having Suez as a subsidiary depot. Cairo supplied its own district and Upper Egypt, while the resources of Alexandria were available for that area. With a view to establishing a peace organization that might lead to the reduction and ultimate abolition of the war depots, and particularly to the evacuation of Kantara—that extremely undesirable place of residence—a beginning was made by opening a small depot at Mustapha, near Alexandria. It must be remembered that the ultimate political policy as regards garrisoning Egypt and the conquered territories was not yet known. It was only possible, therefore, to open the Mustapha depot on a small scale, but everything pointed to the desirability of the peace organization having its centre at Alexandria, the seaport at which stores from home would arrive, and where the great Ordnance base, now being closed down, had proved so useful during the War.

Demobilization, which had been stopped during the Egyptian disturbances, recommenced afterwards at a greatly accelerated pace. The drain on Ordnance personnel had amounted to a drop from approximately 2000 on November 18th, 1918, to 1350 by September 1919 with, in addition, some 250 away on or due for leave. Every effort was made to meet this situation by the introduction of civilians of various nationalities, men from other units, prisoners of war, Germans, Turks and others. But at every point the lack of experienced staff became increasingly felt, for the area to be administered was greater on the day the Peace Treaty was signed than at the cessation of hostilities.

* * * * *

With these words this account of the war work of the Ordnance in this theatre comes to a close. From a departmental point of view a feature is the number of small depots that were opened, many of them in the forward area, although in each case direct supply from Kantara ultimately won the day. It is undisputable

that every extra link in the chain tends to dissipate stocks and staff and that each time a depot in being is closed down there must be some disturbance of work.

To call attention to this fact implies no criticism. The results achieved must be held to have justified the means adopted; and even with their aid refitment was at times a matter of great difficulty with a single line of rails, constantly lengthening, as the sole means of communication. Moreover that this point of view was not overlooked can be judged from the following remarks which occur in the narrative: "In general it is safe to assume that the fewer depots the better the organization. It is both an easy and attractive policy to have many depots. As operations develop there will always be many to urge the opening up of new depots on the assumption that quicker distribution of stores to units can thus be made. That is, of course, a very important consideration, but when practicable it profits more to improve an existing depot than to start another. To have few depots means economy in personnel. To multiply depots increases the danger—a very real one—of holding up stores in places where they may not be especially wanted and from which it may not be easy to get them quickly away on an emergency. The more depots there are the more difficult it is to know where the stores are."

In conclusion the remarks of Field Marshal Lord Allenby, Commander-in-Chief, may be quoted. "I have read with great interest and warm appreciation the lucid record of sound organization and untiring hard work, productive of brilliant results, on which I congratulate all ranks of the Army Ordnance Services."

CHAPTER XIV

MESOPOTAMIA¹

STARTING as a small adventure undertaken by India with the object of safeguarding our interests on the Persian Gulf and preventing the oil wells of Persia from falling into Turkish hands, the campaign in Mesopotamia led, partly by chance and partly by design, to the conquest of the whole Ottoman province of Iraq from the Persian Gulf to Mosul, with a long arm stretching right through northern Persia and reaching at once time to Baku on the Caspian Sea.

The oil was conveyed by pipe line to Abadan, near the mouth of the confluence of the Tigris and Euphrates, to guard which point a footing was established at Basrah some miles higher up the river, and the small force of Turks in the neighbourhood routed. The expedition was then reinforced and it was proposed to make an attempt on Baghdad, whose capture would resound with great political effect. But the strength of the Turkish forces to be encountered was underestimated, the troops despatched on the operation, when a few miles south of Baghdad, found themselves faced by a far superior concentration of the enemy and were forced to retire on Kut. Here, after reinforcements hurriedly sent out had been rather frittered away in piecemeal attempts at relief, owing to the scarcity of river transport, the beleaguered garrison was forced to surrender on the 29th April, 1916; and our prestige, far from gaining strength, suffered a severe blow.

With this part of the campaign we are not here concerned; the operations were conducted by India with its own ancillary services. But it must be said that the attempt against Baghdad was less the result of a well thought out plan than of a policy of drift. The supply and medical arrangements broke down and resulted in

¹ The earlier part of this story is based on a narrative written by Major General Sir Hugh Perry, the latter part on the personal knowledge of the author.

very grave hardships and suffering to troops operating in the most torrid climate in the world, where plague and pestilence abounded.

India normally furnished its native troops with only a bare quota of essential fighting equipment, leaving them to provide for their own domestic wants. It held no war reserves of every species of equipment such as existed in England, and its military hospitals in particular were far from being up to date. It underestimated difficulties, attempted to govern supplies by peace time precedents and complained that the demands of its own representatives in Mesopotamia for river transport were 'querulous and petulant.'

It made no attempt to mobilize the vast resources of its own country and failed to provide many of the extra domestic articles now suddenly called for. Light 21 lb. single-fly tents gave no proper protection from the burning heat of the summer sun and during the winter's cold the troops were left to shiver without any extra warm clothes. India in fact failed to recognize that there are times when to spend money lavishly with both hands is in reality the truest economy and tried to run the campaign on the cheap.

After the grave set-back caused by the surrender of the garrison of Kut, the War Office stepped in and undertook to conduct the further progress of the campaign, sending out General Maude as Commander-in-Chief, and some of its own officers to fill appointments on the headquarters staff and directorates, including Brigadier General (afterwards Major General Sir Hugh) Perry, who assumed charge of Ordnance services in Mesopotamia in September 1916.

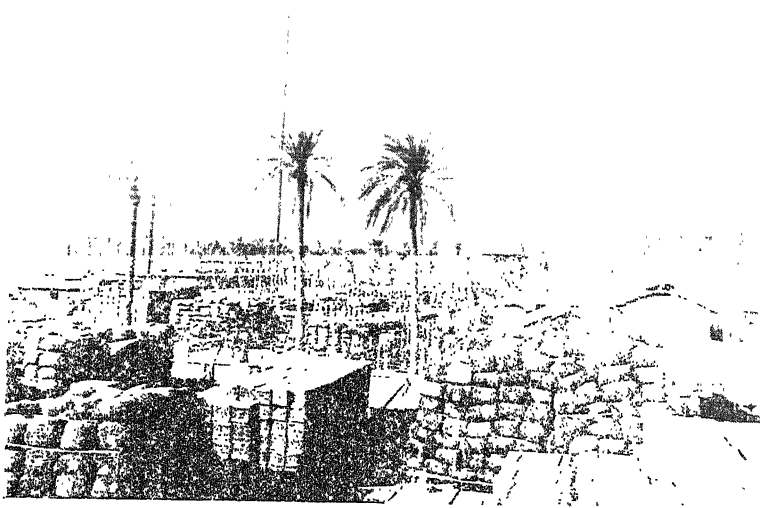
At that time the situation was as follows. There were three divisions in the forward area forming one Corps in positions south of Kut on either side of the Tigris. One division (the only British) was at Amara and one at Nasiriyeh, guarding the lines of communication. Besides this there were two cavalry brigades and some heavy artillery. The senior officer of the Indian Ordnance

Department at the front was A.D.O.S. of the Corps and each division had its D.A.D.O.S.

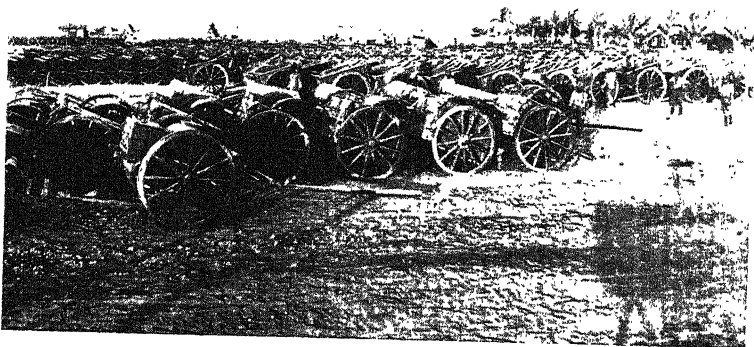
The base depot was at Basrah, where the Director of Indian Ordnance Services was located, and where there were serving in addition but two administrative and four executive officers of the I.O.D. At Sheik Saad, river head on the Tigris, there was a small advanced depot (three officers) and another at Amara (one officer), while small offshoots existed at Nasiriyeh, Ahwaz, and Bushire to supply local troops. These officers were assisted by a staff all told of 67 warrant officers and staff sergeants of the I.O.D. with a smattering of native clerks and artificers and some lascars. There were also two Ordnance mobile workshops in the country, with five Ordnance mechanical engineering officers and British artificers; but they were immobile, one forming the nucleus for a shop at Basrah and the other at Sheik Saad.

The newly arrived D.O.S. was at once faced with a variety of problems, of which the first and most obviously important was very largely to increase this all too exiguous staff. Extra officers, two Army Ordnance Companies and two mobile workshops were cabled for from home, while an establishment was drawn up for an Indian Ordnance Company; India being asked to provide sufficient personnel to form two such companies, with a strength of 100 British, 40 native clerks, a number of Indian artificers and 500 lascars. India was also asked to provide more officers; but though promised, they never arrived. India in fact constantly clamoured for its Ordnance officers to be returned, and once when two were invalided the D.G.O. India in all seriousness asked that in future officers be sent back before becoming ill, so as to be available for duty on arrival.

Of equal importance was the complete reorganization of the base depot, the site for which had been selected when there was less than one division in the country. "My first inspection," writes Perry, "was a most depressing ordeal. The site was constricted and much congested. Everywhere there was a want of neatness and order. This was primarily due to want of supervising



ORDNANCE DEPOT, BASRAH



WAGON PARK, BASRAH

staff, but also to want of space, want of labour and want of transport. On the day I went round there were 70 coolies working, the depot could have employed 700. There were 400 tons of stores ready for the front waiting for transport." The only remedy lay in the complete removal to a new site on the river bank at Magil, a palm grove below the flood level of the river which had first to be cleaned up and drained. Here eventually, largely owing to the exertions of Lieutenant Colonel Howell Jones, who was appointed Chief Ordnance Officer, a very fine depot came into being, with excellent sheds and wharves alongside of which ocean going steamers could berth. Features much coveted by others were the large airy mess and quarters for officers, and the theatre, a popular centre for all.

The condition of ammunition was another matter that needed prompt attention; high explosive shell, lying in the open exposed to the intense heat, having exuded freely. Practically every nature was affected, but in particular fuzed field howitzer shell. These were replaced by unfuzed lyddite which arrived just as active operations were beginning once more, when the work of refuzing had to be carried out under heavy pressure. A very large proportion of the Mills grenades was unserviceable owing to heat or damp or a combination of the two, the ammonal filling having crystallized and become inert; and trench mortar bombs were suspect. In fact throughout this campaign explosives of all sorts were a continual source of trouble, more particularly in the later stage of the war when expenditure was small and most of the stock had passed several summers in the country. But this is to anticipate events. At present the fear was that supply might run short and a large ammunition depot, constructed to resist heat and isolated at some distance inland from Basrah, was built in the desert to hold what it was desired to accumulate.

Another point was that those troops who had come direct from India were armed with an old pattern of rifle, while others who had arrived from France or Egypt possessed the latest British pattern. In some

divisions both types were in use, and each took a different cartridge, making ammunition supply a complicated business. A programme of re-armament was accordingly planned which resulted in all troops at the front having the newest high-velocity rifle.

Further, the new Director of Supply and Transport Services, an officer of the British army, was naturally anxious to rid himself of the job of clothing the troops, a service carried out in India by the Supply and Transport Department ; and, despite the fact that the clothing depot, in charge of an Indian army reserve officer, was in a great state of chaos, the Ordnance had to take it over as it stood and sort out the contents as best it could.

Besides these immediately pressing problems, much else remained to be done. As the area we occupied expanded and the strength of the force increased to seven divisions and a cavalry division, further large increments of staff were required ; and, once officers became sufficiently plentiful to allot each a definite responsibility, the group system, as instituted in France, was adopted. The Indian financial authorities were persuaded to agree to what was to them a novelty—a current local audit of accounts, the Indian arrangement being to keep ledgers in duplicate by carbon process, one copy being despatched to the auditor to be examined, months or years later. Officers' shops were got going, nowhere so necessary as here, where it was impossible for an officer to get anything except on a written order to a far distant firm. At the main shops the A.O.C. installed its own cash clerks, although the Indian Paymaster, who was unable to provide anyone for the work, protested against such an infringement of his prerogative. Any officer who had experience in unravelling his account with an Indian pay office will realize what a boon it was to be able to pay in cash over the counter instead of by signing a voucher against his pay which, by devious courses, would find its way into his account months afterwards as an unexplained entry.

Then there was for long great confusion owing to the Directorates of Railways, Works and Inland Water Transport, besides the Ordnance, each independently

ordering articles such as ironmongery, cordage, lubricating oil and tools through its own headquarters in India ; so that, just as had occurred at the Crimea, one had a surplus of what another was clamouring for.¹ It took long to get this vicious arrangement put entirely right and the whole supply concentrated in one set of hands—those of the Ordnance. The last step that actually brought procedure into line with the British organization was for the Transport to hand over to the Ordnance the providing of Indian transport carts and their harness ; a change that only occurred shortly before the Armistice.

Provision work, managed by an able officer of the I.O.D., Colonel Reed, was throughout difficult as there was a dual source of supply. Articles of Indian pattern, or those which from time to time India professed its willingness to manufacture, were demanded from that country, and others from the central base at Alexandria. But this was by no means the end of the business. Sometimes India would be unable to provide what it had undertaken to supply and then the demand would have to be transferred to Alexandria. That centre again had to ask the War Office to meet many of its liabilities, so that very lengthy forecasts were necessary ; supplies from home taking months to reach Basrah, usually after transshipment at Bombay.

India moreover continued to criticize demands in what seemed an unwarranted manner seeing that the War Office footed the bills. It answered a request for large airy double tents to house the troops by a horrified enquiry whether it was realized that they would cost £32 each? In fact to those of the A.O.C., accustomed to being so open-handedly served by the War Office, it was the attitude of India that seemed ‘querulous and petulant.’

One branch of work however, undertaken from Indian sources through the enterprise of a private citizen,

¹ The D.G.O. in India once sent the R.E. a long list of tools saying they were surplus of India's requirements, while at the very same time he returned a demand for similar tools, made by the Ordnance, saying none could be supplied as none were available.

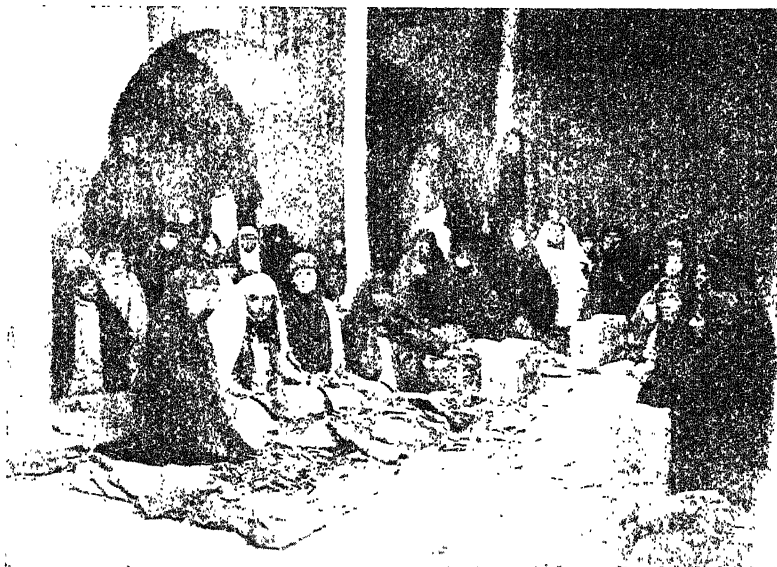
deserves very creditable mention. By arrangement with Simla, Rai Badahur Bhoota Singh, head of a large Panjabi firm, raised certain tent-repair units and sent them out to Mesopotamia, where they became part of the Ordnance establishment. The units were officered by his sons and relations who were given temporary commissions, and staffed by his own employees ; and, besides working at the main Ordnance depots, parties would be sent out to one camp after another to overhaul tents and do other odd jobs. These self-contained units worked admirably and never gave the slightest trouble. The men were skilled at their trade and, seeing that the whole of the troops and hospitals were housed under canvas, their work was invaluable. No account of Ordnance services in Mesopotamia would be complete without paying tribute to the great assistance rendered to the State by Bhoota Singh and his family.

From this account of immediate action and subsequent developments we can turn to the incidents of the campaign. The new Commander-in-Chief took the greatest care to avoid the mistakes of the past, and refused to budge one step forward until he had assured himself that he had accumulated not only sufficient men but sufficient materials of every kind, and transport for their conveyance from Basrah onwards. In attending to these matters, General Maude was indefatigable, interviewing his Directors personally and cross-questioning them as to details, so that his 'Q' Staff complained that there was nothing left for it to do. Transport was improved, the troops were refitted, and substantial stocks accumulated at Sheik Saad which became general headquarters. The two new mobile workshops arrived from England towards the end of January 1917 ; they were posted in forward positions one on each side of the river—one for each of the two Corps then formed—and were at once busily engaged in the overhaul of gun equipments and wheels.

Then, with every preparation made and every future want forestalled to the utmost extent possible, General Maude launched his attack on the Turkish positions and



INDIAN TENT REPAIR UNIT



very speedily, before the end of February, he recaptured Kut and had the Turks in full retreat on Baghdad, closely pursued by our troops. Advanced G.H.Q. embarked and went up by river, and its main body at Sheik Saad was left with no news but an occasional telegram. The events that followed can be best described in Perry's own language.

"The only thing certain was that, as soon as a halt was called, refitment would be badly needed, and a collection of stores was made in readiness for a forward move. The two mobile shops were withdrawn to Sheik Saad from which place they could more easily move by river, for the bridges were not strong enough to allow their going by land. Under instructions from the Commander-in-Chief, 30,000 rounds of 18-pdr. shrapnel ammunition were wired for from Basrah; and with this consignment I ordered up a small detachment in case we had to make an advanced ammunition depot. Some more A.O.C. had just arrived at the base, and consequently I was in a better position to deal with fresh depots than had hitherto been the case. On the 3rd or 4th March we sent forward a barge loaded with 300 tons of items such as socks, boots, horse-shoes, oil, wheels, helmets, and anything else we could think of as being immediately necessary. On this barge I also sent the personnel of one mobile workshop with hand-tools, the rest of the machinery and lorries having to wait for suitable barges.

"On the 7th March I received instructions to join G.H.Q. at Aziziyeh, and decided to take my D.A.D.O.S. with his ammunition records and clerk and one shorthand-typist, and to leave the rest of the office under the A.D.O.S. behind. We started on the 8th in a very slow steamer and made bad time, it being three days before we got to Aziziyeh where we heard that Baghdad had been occupied two days before, and that G.H.Q. had gone forward. Here we found our store barge and another loaded with the equipment and lorries of the two workshops. The two workshop officers also reported, having come on by car, though how they got it across the

trenches was not explained—there must have been some hefty man-handling. Here also I was able to ascertain that the ammunition sent up from the base with its Ordnance party had passed through and continued its journey. After arranging for transport to take forward the store barge and workshops I re-embarked and arrived at Baghdad on the evening of the 15th, where I had an interview with the Commander-in-Chief, when the position was discussed and I was instructed as to what should be specially pushed up, principally tentage and other things necessary for the comfort of the troops during the hot weather.

“A site for my office had already been allotted at G.H.Q., besides one for an Ordnance depot on the right bank of the river a few miles below Baghdad, where the party sent up with ammunition and the barges left at Aziziyeh had already arrived. I was therefore at once able to wire for the rest of my headquarters and for extra staff to form the new depot. A part of the Citadel at Baghdad was also allotted for ammunition. The same evening we got our first demand, an urgent wire from the 3rd Division for socks ; but as my beloved store barge had arrived I was able to regard such requests with equanimity.

“On the 22nd March, one week after my arrival, the main part of my office arrived, as did the C.O.O. from Sheik Saad with the party he brought with him. The troops were still engaged in active operations north of Baghdad, and it was not until the occupation of Samarra towards the end of April that operations ceased and the troops went into summer quarters. With the troops so much on the move, it was not possible to do much in the way of renewals, and the month was spent principally in getting our own house in order and preparing for the extensive refitment which we knew would be necessary as soon as the troops came back to rest. Owing to the danger to be anticipated from Turkish explosives, I was able to get the whole of the Citadel allotted to me and put under my control, the squatters who had jumped accommodation there having to move out. The long

line of communications between Basrah and Baghdad made the getting up of stores a difficult matter, the round trip taking twenty-four days even if all went well; and the system of a weekly meeting of Directors with the Q.M.G. and C.G.S., to allot such tonnage as was available, was started at Baghdad."

One more incident recorded by Perry is worth quoting, namely that an Ordnance officer was the first of the Army to enter the city of Baghdad. "One of the Ordnance engineering officers, Captain Kemp, was following up behind the 13th Division and, coming to the city, went straight on under the impression that the division was still in front of him, while actually it had gone round on the outside and no troops had entered. He found the streets full and was greeted with cheers and handclapping; and passed right through without molestation. Going on beyond the city he failed to get into touch with the 13th Division so returned to Baghdad, which he then found occupied by a brigade of the 14th Division which had been behind him."

The capture of Baghdad was our first real success in the war, and once its security was assured, major operation in this theatre ceased for some time to come. The task was now to consolidate the ground gained and the troops settled down into camps stretching from the borders of Persia to the Arabian desert, with a spear-head thrust well to the north of Samarra. They were occupied in policing the country and quelling minor disturbances, for the perpetual feuds among the Arab and Kurdish tribes had been given full rein by the withdrawal of Turkish officials; and Nejef and Kerbala, the holy places of the Shiah, had always been hot-beds of intrigue.

This summer was a particularly busy time for the Ordnance. Besides housing the troops under canvas, all their equipment and transport needed overhaul and much of their clothing to be replaced. An extensive programme of gun repairs was drawn up and was adhered to despite the intense heat.

Little by little routine arrangements came into force

for supplying the troops. India had at last decided to reorganize its Ordnance Department on British lines and in the autumn obtained Perry's services for its newly created post of D.O.S. India to carry out this change. Sir Charles Mathew, who relieved him, had served both in France and Salonika and, under his guidance, arrangements were modelled on the same general lines as in those theatres.

Nevertheless certain distinctive features remained, chief among which was that work was carried out through a dual organization, half British and half Indian. The Indian Ordnance officer, however capable, had less chance of exercising initiative than his British confrère. Indian army regulations were enormously voluminous and intricate. They abounded with inhibitions and it was a simple matter for Army headquarters, sitting placidly at Simla some ten days or so distant by post, to find fault with any departure from routine action called for by some emergency. In such circumstances keenness to accept responsibility could not be expected. Once he found himself supported by his superiors, however, the officer of the Indian Ordnance Department soon adapted himself to the many unexpected situations that were bound to arise on active service.

The Staff officer again, was unused to having at his elbow an Ordnance officer to thrash out details for him, with the result that the A.D.O.S. of an Indian Corps was too apt to be treated as an executant. Initiative was not expected from him, and no duty but that of obtaining such stores as he was ordered to produce.

Another result due to the same cause was that there were dual scales and types of equipment, the effect of which was more far-reaching than would at first sight appear. As an illustration, take such a simple article as the surcingle-pad used to keep a horse rug in place. Not only did the Indian pad differ in shape from the British, so that the two were not interchangeable, but it was made of leather stuffed with wool (both incidentally materials of which there was a great shortage during the war) whereas the British pad was of

webbing stuffed with coir-fibre—cheaper and equally serviceable. Many thousands of both sorts passed through the workshops for repair so that, in place of one type of job, there were two. Each required different materials, different tools and different workmanship; and the very shiftless Armenian, Jewish or Arab women engaged on work of this sort had to be taught how to do two classes of repair instead of one. The expenditure of energy was increased probably by 50 per cent. As another instance, khaki clothing can be cited. The size rolls used in India and England were altogether different, so that a No. 1 jacket from home corresponded in no sense with a No. 1 jacket from India. They were undoubtedly instances where standardization would have been impracticable; but in numerous cases, of which the above are examples, there was nothing to warrant a divergence of pattern which increased heavily the difficulties of maintenance.

Another feature has already been mentioned, the intricacy of provision work with three possible sources of supply—India, Alexandria and England, and the very long forecasts necessary in framing demands for upkeep. Moreover, except for a few petty bazaar industries, there were no local resources that could be tapped. In this respect the Ordnance in Palestine were much more favourably situated, having the Levant base close in rear to provide for all its wants, with the splendid workshops of the Egyptian Government at its service.

Lastly the physical features of Mesopotamia have to be taken into account. The country consists of a fertile strip of alluvial soil, bounded on either side by the sands of the desert, through which meander the two great rivers—Euphrates and Tigris. The Euphrates is not navigable for craft of any size, but the Tigris forms a natural highway from north to south, and it was on this river that the troops depended for their supply services.

In the last chapter, General Bainbridge has referred to the predominating influence on the conduct of operations of the railway gradually pushed forward into

Palestine and how, every time an advance occurred, the troops 'ran away' from railhead, making it impossible for the time being to keep in contact with them. In Mesopotamia it was the Tigris that was the governing factor, but here the conditions were more favourable and, as Perry has recounted, it was possible to have barge loads of equipment, ammunition and mobile workshops at Baghdad within a few days of its occupation by our troops, despite the rapidity of their advance—in fact immediately it was safe to take supplies so far forward.

On the other hand, barge traffic on the Tigris was painfully slow in comparison with movement by rail. Owing to its sinuosities, two miles were covered for every mile advanced, some 500 miles of water with a strong current separated Baghdad from Basrah, and there were constant breakdowns. With every spring flood the river would carve itself out a fresh channel in the soft soil and then, when its level fell, new sand-banks and shoals would appear.

To compare the two campaigns once more. It will have been noted that in Palestine advanced Ordnance depots were on several occasions located at or near railhead, and that on each occasion they were soon after closed down and replaced by Kantara—right back on the Suez Canal—as a direct source of supply to the fighting troops, so expeditiously could consignments be sent forward, even with a single line of rails. But in Mesopotamia, even when our troops were below Kut, an advanced depot was needed at Sheik Saad ; and, with the advance to Baghdad, it would have been utterly impracticable to provide for their wants with no source of supply nearer than the base. We have indeed, in these two theatres, exact contrasts. On the one side a line of communications, slow in construction but rapid in operation, and on the other a line ready made, but tedious and uncertain in operation.¹

¹ It is true that a railway was constructed as soon as possible linking Basrah and Amara on the right bank on the Tigris and another on the left bank linking Baghdad and Kut ; but there remained a gap between Amara and Kut that could not be bridged by rail on account of the

Thus, owing to the time taken on the journey, it was found advisable, once Baghdad was fully secure, to instal there a very substantial Ordnance depot, with ample stocks of every kind and facilities for repair and salvage work almost on a par with those at Basrah. The depot at Sheik Saad on the other hand was closed, but a new depot was built at Kut to hold a reserve of ammunition, the base being so far in rear. This depot, like that at Amara, also looked after all troops in its vicinity.

The depot at Baghdad was in two halves. Most of the stores and clothing were at the site originally selected on the right bank of the river below the town, a tented city of peculiar construction, for under each block of canvas was dug a sunken space some four feet deep, with the tent poles standing on props—this semi-underground life being adopted for coolness. Here, among other institutions, was a laundry capable of very high class work managed by a temporary officer connected with Pullar's dye-works, manual work being carried out by chained convicts from the civil prison.

The other half, comprising the armoury, magazines, workshops and laboratory was situated in the Citadel of Baghdad, which deserves a description, both because it was the most important and interesting building in the city, and because its condition when taken over gives an idea of what a Turkish Ordnance depot was like. I quote once more from Sir Hugh Perry :

“Entering the Citadel by the south gate the first storehouse on the right was found to contain a collection of arms, swords of all sorts from old Arab swords to modern articles of the ‘tailor’s’ variety, revolvers of different descriptions, some automatic pistols and a fair number of rifles. The rest of the space was occupied by fleas. These were fairly plentiful all over the Citadel,

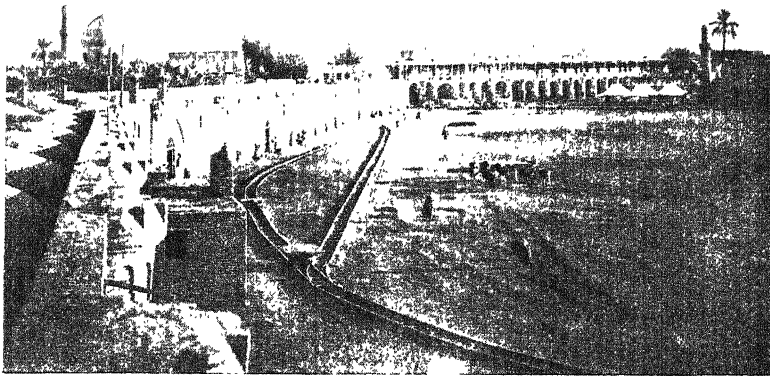
nature of the country. If use was made of these lines for the transport of stores, two transshipments *en route* had to be made and part of the journey was still performed by water, with the result that, except in a few cases of great urgency, direct barge traffic from Basrah to Baghdad remained the sole channel of supply.

but in no place did they swarm quite so badly as in this room. The disposal of the swords gave some trouble as there is nothing in regulations regarding such loot. Some were of real intrinsic interest, and all were of interest as souvenirs. After the Army Commander had selected the two or three he cared to keep the remainder were distributed among others. Among the stuff found were a number of what appeared to be pioneer axes ; they were modern, but the blades were ornamented with some Turkish figuring, and they were not unlike in shape to Saracen battle-axes. As such they were in much demand among the curio collectors.

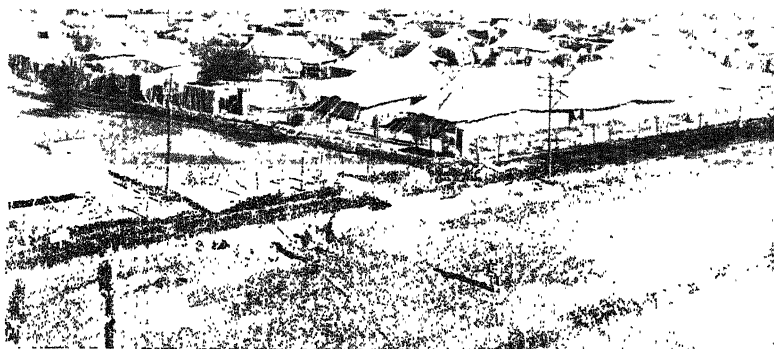
"The second store had apparently been a small ammunition store. It had been burnt out, and the floor was covered with a coating of lead, which was torn off in sheets, melted down and cast into ingots with ' Ordnance Baghdad ' moulded on them. (This lead was eagerly sought after by the R.E. for making bridge foundations on account of its weight.)

"The next store was intact ; it had the usual miscellaneous assortment of stuff, cannon and small arm cartridges, rifles and smooth-bores. Here we also found the Turkish Ordnance officer's ledgers. He must have been glad he had to skedaddle and lose them, they would never have passed audit. Here and in the other stores one had to be careful where one trod, the floor had been sown with detonators and caps ; and there were a few loose sticks of dynamite. It was in this store that we got a warning to be careful how we handled Turkish firearms. One of the old muzzle-loading muskets went off when it was being pulled off the stack and the lascar who had hold of the muzzle had a narrow escape. We found that most of the old muskets were stored loaded, but to store one capped and at full cock seems rather careless even for a Turk.

"In the old Palace were some thousands of muzzle-loaders, some of them flintlocks of immense bore and length, and with fine inlay work on the stocks. Also, a contrast, two flammenwerfer which had not been unpacked, but were still in crates. The Palace is old, dating



THE CITADEL, BAGHDAD



RIGHT BANK ORDNANCE DEPOT, BAGHDAD

back probably to the fourteenth century. In her book *Amurath to Amurath* Miss Gertrude Bell describes the trouble she took to get permission to see this old Palace, and how the Turkish Commander refused on the ground that it was used as a military storehouse and strangers could not be allowed to go into it. As Miss Bell was working in Baghdad with the Political Officer, I arranged, as soon as the place was cleaned up, to take her over, and my information as to the date comes from her.

"The workshops had been fairly well destroyed, though whether all the damage done was by the Turks or some by our own aircraft is not known. All the machine tools had been damaged with a view to rendering them unserviceable, but as a rule they were not beyond repair; and, although old-fashioned, they were quite useful and made a welcome addition to our shop equipment. At the workshops we found a good many Kut captures. There were, I think, two 13-pdrs. and eighteen 18-pdrs., all of course rendered unserviceable before capture. Of the carriages either four or six were repaired and put to stock, and from the others many useful components were recovered. The only other buildings in the Citadel which need be mentioned were a Mosque and a prison. I am not sure whether the Mosque was used, but the prison certainly was and had a comparatively large population. We made full use of this population for repair work of the sort usually given out to such places, and the prisoners worked very well and were of considerable assistance."

Baghdad was the terminus for barge traffic, the upper reaches of the Tigris being too shallow for river steamboats; but between Baghdad and Samarra lay the first section of the railway with which it had been the great ambition of Germany to link Europe with the Persian Gulf and obtain a place in the Oriental Sun. In their hasty retreat, the Turks left this railway practically intact and it was extended northwards as far as Tekri, in the direction of Mosul; while narrow gauge lines radiating from Baghdad to the Euphrates Valley on the

one side and to the borders of Persia and Kurdistan on the other, were constructed to serve the troops to the east and west. At, or in advance of, the various railheads on these lines, D.A.D.O.S.s had their dumps from which stores, obtained from Baghdad, were delivered to units by Indian transport carts or light motor-vans. Here were situated mobile workshops which, although gun repairs were infrequent compared with France, found plenty to do in tending other sorts of equipment. Here also were to be found ammunition dumps, replenished from the central magazine at Baghdad.

The contrast between climate in summer and winter was most extreme, ranging from 130° registered shade temperature to 10° of frost. During the summer, nothing could be borne beyond an open shirt and khaki shorts, with sun helmet, spine-pad, coloured glasses and even sometimes a parasol when out of doors; while in winter thick underclothes, service dress uniform, overcoats and blankets were essential; and the half-yearly exchange of all this, with the examination, repair, disinfection and washing for well over half a million of men, including Indian followers, was a particularly heavy job. Moreover the work, divided between Basrah and Baghdad, was at its highest pitch in the summer when men of other Corps were at rest in camp or on leave at some Indian hill station. This bore very heavily on the A.O.C. and I.O.D., for it was then that sickness was most rife, and a depleted staff had to work double tides to get through the job before the winter season opened once more. The climate of Basrah, at the head of the Persian Gulf, is particularly damp and pestilential, and it was this pressure of work that accounts for the percentage of Ordnance hands in hospital there being abnormally high.

A few special features of salvage operations deserve mention. A highly popular form consisted in the conversion of old bottles into tumblers by breaking off their necks and smoothing the edge; for these there was a constant demand from messes and canteens, glassware being unobtainable in the country. The repair of officers' watches was an industry that gave employment

to every watchmaker to be found in Baghdad, working under our own artificers. When visiting a division on the eve of an engagement, the G.O.C. told me that he and his A.D.C. had not a reliable watch between them wherewith to fix zero hour. It was a matter of serious difficulty to cope with the repair and adjustment of watches during this campaign.

Boot repairs were a far more serious matter. Owing to the extreme dry heat of the summer up country, it was with difficulty that boots could be worn if laid aside for forty-eight hours, so hard did the leather become. Men simply would not discard a comfortable pair except as the last extremity, with the consequence that what came in for repair at Baghdad was only fit for the rubbish heap. To remedy this, the central repair establishment was broken up into gangs which toured round from regiment to regiment. Each company's footwear would be inspected in turn and while a man's boots were being mended he received a soft easy pair, which he returned when he got back his own once more. The plan worked admirably, even though it involved the substitution of hand-tools for machinery; and the arrangement was very popular among the troops.

Another serious difficulty lay in the scarcity of wood or coal as fuel—everything having to be imported. The oil-fields furnished an abundance of crude oil, but this gave off such dense sticky smoke that it was impossible to use it for cooking. For a trench cooker, a very simple and ingenious arrangement was contrived to avoid this nuisance. The oil was slowly fed into an angle-iron under the camp-kettles, which were surrounded by muttie; and into the stream of oil water was dripped from a tin can. When the flow of the two liquids was properly adjusted the sole residue was a thin clear vapour. Many attempts were made to apply this arrangement to the travelling kitchen, but in vain. Seeing how little bulk is occupied by oil, the adaption of our field cookers to burn this type of fuel is a problem well worth solution.

The next events were due to the elimination of Russia

from the war. Russian troops, who had been engaged against the Turks in the Caucasus and North Persia, disappeared and left the road to Afghanistan and India open for German or Bolshevist emissaries to stir up trouble. It was consequently decided in the spring of 1918 to organize a small 'hush-hush' expedition, based on Baghdad, to operate in North Persia and counteract enemy intrigues. By degrees the strength of this force increased and a brigade, with field artillery, crossed the Caspian from Enzeli to Baku to assist the local Russian government in saving their town from capture by the Turks. At this time I relieved Mathew and can vouch for the difficulty of organizing a supply service over such a long straggling line, with small bodies of troops dispersed at intervals. The crux of the matter was transport. A short length of railway had been laid from Baghdad to Table Mountain; but beyond this much of the route, stretching some 600 miles to the Caspian shore, was over a very mountainous track, the immemorially old highway between east to west and really fit only for pack transport. Everything had to be carried either on camels and mules, which led to much going astray, or else on Ford box-cars, of which three-quarters of the capacity was occupied by petrol and oil for the outward and return journey.

Artificers were sent to the Caspian to mount guns for the naval force we formed on the Lake, and a laboratory party went to Baku with a view to adapting certain Russian ammunition for our use. Apart from this it is fortunate that there was no need to set up an Ordnance service at Baku as supply difficulties were so great. The Russians and Armenians were Bolshevist in method if not in name. They refused to fight and it was impossible for our small force to hold the great amphitheatre of hills guarding the town and its oil-wells. After a short stay, and in spite of opposition, we were compelled to withdraw and abandon such pusillanimous soldiers who would not defend themselves.

Neither was there any fighting in Persia apart from one or two sanguinary combats in the northern region whose inhabitants objected to our presence. Small blame seeing

how the country had been devastated in turn by Russians and Turks. It is difficult to justify our presence in this neutral State which was at peace with all the warring nations, though by furnishing work and wages we undoubtedly saved many from starving.

Thus demands were chiefly confined to clothing and domestic wants ; though even so stores accumulated at Table Mountain quicker than they could be removed. The headquarters of the force was at Kasvin, where in time a depot and workshop were formed ; while another depot was at the important centre of Hamadan. Headquarters of the line of communications from Baghdad were at Kermanshah, where an Ordnance officer looked after the conveyance of goods ; and, dispersed at intervals of 150 miles or so, were small dumps of essential articles such as clothing and boots wanted from day to day. Eventually, after the armistice with Turkey, and when our troops in the Caucasus reached Baku, the responsibility for providing for north Persia was transferred to that army to relieve the difficulty.

The last operation in Mesopotamia followed close on the heels of Allenby's victorious advance into Syria, by which time the strength of the force had been reduced to five divisions and a cavalry division. Largely owing to a brilliant turning movement by the cavalry, a very considerable Turkish force was routed, and Mosul, in the extreme north of the country, was occupied. Here the last new Ordnance depot, a small affair only, was opened shortly after the armistice with Turkey was signed on October 30th, 1918.

To cope with what was to be handed in on demobilization, for the returning troops were to take nothing with them but their personal equipment, large areas of 100 acres each were enclosed in the desert at Basrah and Baghdad, roads made, sheds built, and railway sidings constructed. These demobilization depots were in two parts, the reception portion where the equipment was taken over and roughly checked, and the storage portion

where the goods, after being examined, classified, cleaned and packed up, mostly by prisoners of war, were stacked. To these depots were transferred such stocks as were surplus to future requirements in so far as such requirements could be estimated; for, as in Palestine, the future policy of administering Iraq took long to settle.

In the spring of 1919, owing to trouble on the Afghan frontier, India thankfully took over from Mesopotamia a large number of surplus guns and ammunition with other war-like stores, affording a welcome relief; but unfortunately India also wanted for her campaign many of the by now depleted staff of the A.O.C. besides those of the I.O.D. Demobilization of Ordnance personnel had to be temporarily stopped, causing grave discontent among the rank and file of the Corps, who felt they were being overlooked in this far-distant theatre; and trouble was only averted by the tact with which the senior officers of the A.O.C. and I.O.D., Colonel McVittie at Basrah, and Lt. Colonel Fanshawe I.O.D. at Baghdad, handled a difficult situation.

The method of disposal of surplus stores in this arena differed in some ways from elsewhere.

Ammunition was in a very bad condition owing to the fact that much remained, manufactured in the early days of the war, that had been stored in the country for several years exposed to the most intense heat. There had been more than one spontaneous explosion of long-travelled rounds in gun limbers when jolting over the country. The usually recognized principle, that everything is serviceable unless proved to be otherwise, was therefore abandoned, and the reverse assumed. Every round of ammunition that could not be definitely pronounced serviceable was classed as unserviceable. Ammunition Units visited all forward dumps and units in Mesopotamia and Persia, they set aside what was most evidently good, and all the rest they collected into big dumps in the desert which were fired; the same principle being adopted at the large depots in the rear. In this way thousands of tons of doubtful explosives, then such

a drug on the market, and much of which were in a dangerous state, were blown into space without troubling the War Office, whose officials were no doubt glad to be relieved from having to give decisions at such a troublous time.

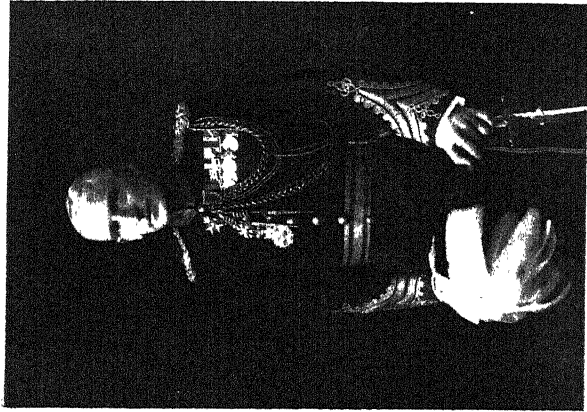
To deal with surplus goods a Sales Board was formed with the D.O.S. as president, the members being other Directors, such as those of Supply and Transport, Railways and Inland Water Transport, the Financial Adviser and representatives of the Civil Government. Each Director was responsible for the details of his own work, the Civil Commissioner had the first call at a valuation on anything that was to be got rid of, and the Board as a whole co-ordinated methods of procedure and dealt with matters of policy. Qualified temporary officers were appointed as auctioneers and rubbish, such as old boots, waterproof-sheets and pots and pans, sold like wild-fire. But there the matter ended. The small local market was quickly glutted and there was no outlet for the large surplus stocks of articles of real intrinsic value. The remedy appeared simple. After handing over to the Civil Government anything wanted for developing the country, mainly railways, wharves and river craft, the Sales Board could have disposed of the balance under instructions from the Disposals Board in London, either by shipment elsewhere or by destruction.

But the Disposals Board thought otherwise. It replaced the Sales Board, which cost the taxpayer nothing, by a large and expensive staff of its own, with Commissioners and Deputy Commissioners, auctioneers and clerks whose salaries amounted, if I remember aright, to some £10,000 a year, and who had not the intimate knowledge of the goods to be dealt with possessed by the members of the Sales Board. The Disposals Board itself was so alarmed at the cost of its establishment in Mesopotamia that, some time after my return to England, I was sent for and questioned as to the need of all this staff. I could only reply that in my opinion the expense was not justified. This matter is worth noting for, while it was no doubt essential in England and France to

relieve the army of the task of disposing of the enormous mass of buildings and materials left over after the war, an organization constituted similarly to the Sales Board in Mesopotamia seemed admirably adapted to deal with the situation in this smaller theatre of operations.



MAJOR GENERAL A. FORBES, C.B., C.M.G.,
D.O.S. MESOPOTAMIA



BRIGADIER GENERAL R. K. SCOTT, C.B.,
C.M.G., D.S.O., D.O.S. EAST AFRICA



BRIGADIER GENERAL T. W. HALE, C.B.,
C.M.G., C.B.E., D.O.S. ITALY

CHAPTER XV

EAST AFRICA¹

WHEN war was declared in 1914, the idea that no military operations would be undertaken in South Africa was at once found to be incorrect. The Germans in East Africa were more prepared than we were. The thousand miles of railway from Dar es Salaam to Lake Tanganyika had just been completed and opened for traffic and, whether by design or accident, there were a number of German officers in the Colony who had come out to assist in the celebration of the opening of the railway. They had accumulated a considerable stock of guns, machine guns, rifles, ammunition and military stores of all kinds. Besides troops actually in East Africa, they had so carried out their propaganda, as friends of Islam, with the Arabs in Eastern Soudan, that they were able to raise a considerable number of levies in that quarter. They also had command of the Lakes, except Nyassa. But their chief asset was their commandant, Colonel von Lettow Vorbeck, a dashing, resourceful leader. Knowing that the British were ill-prepared, his plan was to cross the northern frontier immediately, occupy Mombasa and Nairobi and seize the Mombasa-Kisumu railway. He had initial successes, as within a fortnight after the outbreak of war, a force under Major Kraut occupied Taveta, a frontier town and a road centre which lent itself to operations against Mombasa, or for attacks upon the railway. But his main objective was not reached owing to the timely arrival at Mombasa of a small force from India, under the command of Major General J. M. Stewart. Had the disembarkment of this force been delayed only by a day or two, the chances are that Mombasa would have fallen into German hands.

When General Smuts took over command of the operations in February 1916, some eighteen months had elapsed and the situation was very much changed. Though the Germans still held all their own territory, their offensive

¹ I am indebted to Colonel Oldfield, D.S.O., R.A.O.C., for this chapter.

enterprises, north against Mombasa, north-west against Uganda and south-west against Nyassaland, had all failed. Moreover they had lost the whole of the lines of communication through the great Lakes, which had been wrested from them by the British.

Few people realize the extent of the theatre of operations in this East African campaign. It extended from Uganda (inclusive) on the north to the river Zambesi on the south ; and from the Indian Ocean to Rhodesia. The main fighting, however, was mostly near the boundary between British and German East Africa.

The climate can be divided into two main zones : the lowland, which includes all those parts of the country below 4500 ft. and the highland, which comprises the remainder. The lowlands lie on the coast side and on the west or lake side of the highlands and to the south of Kiu, a station on the Uganda railway. The lowlands are not healthy and the troops suffered considerably from sickness, especially during the rainy seasons—the short rains in October and November and the long rains in March and April. The highland climate generally is very good, especially near Nairobi ; but the fighting and movement of troops were to a very considerable extent in the plains, which are more than unhealthy for Europeans, and during the rains the roads are practically impassable.

At the beginning of the war, the Governor had at his disposal three battalions of the King's African Rifles, but there were considerable numbers of police, and he at once called upon all British residents to come to the help of the Protectorate. One infantry regiment and one regiment of Mounted Rifles were raised immediately from the settlers, many of whom were ex-service men. In addition, at the main centres of the white population, defence corps were raised for local protection.

Then, as has been previously stated, soon after the outbreak of war, India sent a small protective force, which was followed in a few months' time by a much larger force of about 6000 men. Finally, the East African Force, of which General Sir Horace Smith Dorrien was

chosen to be Commander-in-Chief, came into being in November 1915. His staff and heads of departments, which included Colonel R. K. Scott as Director of Ordnance Services, met in London early in December 1915. The choice of Scott, at that time serving in France, was a happy one, seeing that he knew all the heads of his department at the War Office and was well known by them. This was a very useful asset for a man who had to put in later most untoward demands for supplies for the heterogeneous force which collected in British East Africa and to meet unforeseen circumstances.

Unfortunately General Smith Dorrien became desperately ill on board ship on his way to the Cape and on arrival there was unable to proceed to take up his command. He resigned in February 1916 and General Smuts was appointed to relieve him. General Smuts in his turn was relieved by General Hoskins, who was relieved in January 1917 by General Van Deventer, who remained Commander-in-Chief to the end of the campaign.

Scott was for five weeks in London, conferring with the new staff and making out lists of stores required to be collected and sent out to East Africa. It was a very difficult job, as there were very few data to go on as regards the number of troops to be provided for, the stock already in the country, and what was being sent by India. Moreover it was not clear at first who would supply the needs of the Indian and South African contingents. Demands were eventually prepared on a basis a good deal larger than the official position as reported appeared to warrant. As it turned out this action was fully justified by events. It was decided that a six months' supply should be provided for a force of 20,000 to 23,000 white troops and the same number of coloured troops, besides 4400 white mounted troops. Lt. Colonel C. T. Fisher was appointed D.D.O.S. L. of C., and Major Routh (I.O.D.) A.D.O.S., with Captain Sparey as mechanical engineering officer. The 51st Company A.O.C. was detailed to form the personnel.

The supply of tents was one difficulty. They could not be provided from England—India had promised a supply

by the end of December, but there was no certainty about it. Then ammunition, R.E. stores, demolition explosives, clothing for different types of troops, etc. etc., had to be arranged for ; scales, number of rounds per gun, and the hundred and one details which have to be thought out to meet the needs of the troops at the commencement of a campaign in a far-distant country.

On arrival at Cape Town on the 30th January, 1916, arrangements were made for the South African Ordnance Department to forward any stores available on receipt of cables from East Africa. But while the Union Government undertook to provide all the help it could for its own troops while serving in East Africa, the final responsibility for maintaining the whole force rested with the Imperial Government.

Scott and his staff arrived on the 12th February at Mombasa, where he found that Ordnance Services were in charge of the Indian Ordnance Department under Colonel Foote, an officer many years his senior. As Brigadier General C. P. Fendall says in his book on the campaign: "Some of them" (i.e. the original Indian heads of services) "showed very plainly they did not like it and it was natural that they should not, but there was no need to show it quite as aggressively as they did. What they disliked as much as losing their places at the head of services was being brought under English ways of working in place of Indian. With the exception of these departmental officers everyone seemed pleased with the change; glad that, at last, there was a chance of something being done, and that there was a staff in the country to cope with the work." These few words quite sufficiently explain the somewhat delicate and difficult position Scott found himself in, without enlarging on the subject. It was decided that the Indian regime should continue for the first few weeks, and that during that time the new D.O.S. should re-organize Ordnance services and finally take over under the home system on March 15th, 1916.

Another difficulty the Ordnance had to contend with was one which often occurred at the commencement of

operations. This was to get the staff to realize what were Ordnance duties as apart from 'Q' staff duties. For example, the I.G.C. ordered an Ordnance officer to one place, when Scott had already posted him to another. Again, the D.A.A. & Q.M.G. wired to India for 'saddles' on his own initiative, without consulting the D.O.S., when 'sets of saddlery' were required. But it was not long before everyone came into line, each doing his own job, and thereafter relations between supply services and staff ran very smoothly.

Scott had to take over a very mixed collection of personnel. Besides the A.O.C. there were the Indian Ordnance Department, South African Ordnance Department and the British East African Ordnance Department. His final organization was as follows: D.O.S. at headquarters, one D.D.O.S. L. of C., A.D.O.S. of each line of communications, a D.A.D.O.S. for each of the three divisions, and the other usual Ordnance appointments.

The force comprised British, South African and Indian troops, the Nigerian brigade and Protectorate forces, including Kavirondas who were called the 'skin brigade' because their uniform consisted of their birthday suit.

At this time there existed four main Ordnance depots and four advanced depots. The former were at Kilindini, Voi, Nairobi and Entebbe; the latter at Mbuyuni, Kajiado, Kisumu and Simba. Later on in the campaign depots were opened at Mombo, Korogwe, Moschi, Morogoro, Dodoma, Dar es Salaam, Kilwa-Kissiwani, Lindi, Mtama, Mtandawala and Port Amelia.

There would appear to be a great number of depots but many of them were only in existence a few months; the reason for these scattered depots being that there were very few roads and railways, very little transport, and that stores and supplies were carried mainly by porters where the railway did not serve. Therefore depots had to be opened to conform to the movements of the troops which at times were rapid. Owing to the German mode of operations, the change of venue altered continuously. Von Lettow had only a few white troops and he lived on

the country, even making his own boots and clothes. Consequently his plan of campaign was never to accept a decisive fight but to keep retiring south, our troops following him and trying in vain to round him up. In August 1916 Von Lettow did make a stand in the Nguru mountains, but General Smuts had anticipated this move by sending a mounted brigade, supported by an infantry brigade, to the west round by Kimbe to Mhonda, with General Sheppard's brigade operating on the east to Mhonda. Owing however to the tracks being unsuitable for wheeled transport, it was found impossible for the two British forces to meet and enclose the Germans, and Von Lettow slipped through to the south once more.

For the same reason the lines of communication were continuously altering. In March 1916 there were two lines: Voi-Taveta (this line being extended later to Arusha) and Nairobi-Kajiada-Longido.

As the campaign proceeded more and more lines were opened up and closed and the study of the map will give an idea of the continuous shifting of the troops, consequently the varying depots and means of transport. The lines Tango-Korogwe-Kondoa and Sanja-Kondoa were both opened in August 1916; Dar es Salaam-Mpwapwa-Tabora was opened September 1916 and lasted till the end of the campaign; Kilwa-Kissiwani-Mahinge, October 1916 to June 1917; Dodoma-Iringa, opened January 1917; Lindi-Masasi-Ngoman, opened March 1917, closed December 1917. The line Port Amelia-Medo-Boma in Portuguese East Africa was opened towards the end of 1917 for a very short time because the Germans moved rapidly south towards Mozambique. They then moved north again almost at once, into northern Rhodesia.

From September 1916 Dar es Salaam was the main base depot; Kilindini (or Mombasa), which had been the principal base depot and the port of consignment at the commencement of the campaign, being used as a transit depot and also to maintain the recruiting depot of the King's African Rifles at Nairobi. In connection with this Corps, it may here be mentioned that twenty-three

additional battalions were raised and equipped during 1916/17.

Dar es Salaam was a good-sized depot with a staff of about seven officers and 150 other ranks. This depot also held ammunition at a place about one mile from the main depot.

The D.O.S. moved from Nairobi in October 1916 and made his headquarters at Dar es Salaam.

In British East Africa transport was a chief problem. It consisted at first mainly of pack mules and ox-wagons. Soon after our arrival, however, rapid movement was called for, the lines of communication were considerably extended, and transport difficulties commenced.

Large numbers of ox-wagons were required in the Lake district. The wagons were hastily manufactured in the workshops at Nairobi and were despatched, together with the necessary ox-gear, to Kisumu. Shortly afterwards it was reported that all the oxen were dead and the wagons were scrapped. In addition to the above, ox-wagon and trek-gear were being asked for on all sides. South Africa was sending the ox-wagons, also the gear, but these often came separately. Besides this, owing to bad roads and broken country, a very large number of spare yokes, skeys, trek-chains, etc., had to be carried, because naturally the transport officers responsible for getting food and other supplies for troops could not take any chances.

Again, complete gear had to be provided for the mule wagons which were converted locally to ox-draught. All this entailed heavy work. When the oxen died of tsetse fly, donkey pack-saddlery began to be asked for. A large number of donkeys were ordered from South Africa and South America, and on October 1st, 1916, the D.O.S. were given orders that by the 15th October 5000 sets of donkey pack-saddlery were to be ready. The only materials available were jute sacking and raw cotton (for stuffing). Moreover it was difficult to get the experts to agree on a suitable pattern. Sewing machines were commandeered but no needles could be obtained.

Eventually these articles were made out of umbrella ribs in the Ordnance workshops. The saddles were ready to time but the donkeys did not survive the tsetse fly long enough to demonstrate whether the design was all that could be desired.

The masses of donkey pack-saddlery, mule and ox-gear, collected at Dar es Salaam by the end of the campaign, were eloquent evidence of the efforts made to cope with the question of transport.

At one time experiments were made to produce some sort of mono-wheel arrangement which might ease the situation, but it was found impossible to teach the natives the trick of manipulating this vehicle.

It was then decided that the only possible means of transport, away from the railway, was by porter loads, and the Director of Military Labour scoured the whole of British and German East Africa to recruit every native possible. The Ordnance had to provide the necessary packing cases, etc., suitable for porter loads, and the requisite clothing and equipment for the native carriers, the number of whom increased from 41,000 in March 1916 to 168,000 in June 1917.

The personal equipment of these carriers was as follows: a panga or corn-knife (a sort of machete), a blanket, a water-bottle, a jersey or jumper, a number disc and a haversack. The jerseys or jumpers were given to shrinking, and these warriors at times had much the same appearance as that obtained by placing a hat on the Venus of Milo. Owing to protests by the clergy and nursing sisters, a pair of khaki shorts had to be added to the equipment of those who were employed in civilized parts. The casualties among these natives were very heavy, more especially when operations moved in the vicinity of the Rufiji and Rovuma rivers.

Towards the latter end of the campaign, matters got so bad that recruiting had to be extended to Portuguese East Africa. Men obtained from that source were, however, a very poor class of native and a good number of them died owing to the climate soon after they landed in German East Africa.

Another difficulty was that the native carriers would not take money, as there was nothing on which to spend it. Arrangements had thus to be made to purchase many kinds of articles to be used as barter and we come across queer terms, such as 'Red Kasutos,' 'Americani,' 'Kaniki,' 'Kikoys' and 'Lesos,' most of which are merely local names for feminine portions of attire or cloth for making the same.

Mosquito nets were another great source of trouble. The difficulty was not so much in obtaining the netting from Zanzibar and India, as in the fact that the medical authorities kept changing the shape of the net. After this question had been more or less satisfactorily solved, a special malarial expert (sent out from England) pronounced that the nets were all wrong in design and mesh. The only net to be used was one of his own pattern. This was rather a bombshell. There were at that time some 300,000 nets in stock which, under this decision, were to be scrapped as useless. The D.M.S. of the Forces convened a conference to discuss what was to be done. It was decided that the malarial expert should go to Morogoro (with his net) to investigate malaria on the spot. Within three days he was invalided to South Africa suffering from malaria, and his successor fortunately took a more reasonable view of the matter.

Another incident in this connection was the receipt of urgent demands from the South African mounted brigade for mosquito nets. As apparently their indents had been met in full, Colonel D. D. J. Hill (who succeeded Colonel Foote I.O.D. as D.D.O.S. L. of C.) was sent up to investigate. He found that the South Africans had cut up all their stock of nets to make bags for biltong, as they found that the netting was very useful in keeping the flies off the meat!

The campaign was ended by Von Lettow surrendering unconditionally in Rhodesia in September 1918. After that date the Ordnance were employed in collecting all the stores at Dar es Salaam and disposing of them. Quantities were returned to India and large stocks were

sent to Durban for disposal by the Government of the Union of South Africa.

Besides those of transport, the main difficulties of the Ordnance in this theatre were due firstly to the distance from the main source of supply (some 5000 miles by sea) and secondly to sickness, which led to very many hospitals having to be equipped.

A great deal of adaptability was called for and this was no doubt realized by the G.O.C. when he stated in his dispatch of January 1917 that "The Ordnance Service is to be congratulated on having so successfully met the many varied calls made upon it; which success bears testimony to the excellent organization of that service."

CHAPTER XVI

ITALY

ITALY entered the War in May 1915, at once seizing positions across the Austrian frontier, with a front stretching from west to east through the Carnic Alps and then, turning southwards, following the course of the River Isonzo to the Adriatic. During the next two years the capture of important mountain positions, especially that of Monte Nero in the upper region of the Isonzo, enabled the Italians to make headway across the lower reaches of the river and in the spring of 1917 an effort to capture Trieste was determined upon.

To assist in this operation ten batteries of artillery, armed with six-inch howitzers, were lent by England; the gunners being accompanied by half a company of the A.O.C. under Lieutenant Colonel Hayley who was appointed A.D.O.S. to the force. Headquarters were installed at Gradisca, with an Ordnance workshop nearby, while Palmanova, nine miles to the rear and once a fortress on the frontier of the Venetian Republic, was allotted as the site for the Ordnance depot, mainly for ammunition, as the force consisted solely of artillery. In front of Gradisca two ammunition dumps were formed, each under an Ordnance officer—one for each group of howitzers—connected with Palmanova by railway. No mechanical transport accompanied the expedition, as the Italians undertook to furnish what was required.

For materials the force was based directly on England, and the War Office was to send what was wanted to Havre, whence consignments were to be transmitted by rail straight through to Palmanova. But there must have been some hitch over the arrangement, for nothing arrived before the 12th May, the very day the bombardment was to open, by when the batteries had almost exhausted the ammunition they brought from England in preliminary registration. The supply of ammunition that came to hand that day arrived therefore in the nick of time and was at once diverted to the forward dumps. After this, ammunition and stores began to arrive regularly;

and when the operation, which resulted in a gain of ground in the coastal region, came to a close at the end of May, good stocks had been built up and normal arrangements for supply and demand were possible.

In July the depot was inspected by the Duke of Connaught, who expressed his satisfaction with the arrangements made for the men's comfort ; and it may be noted here that the Italians were always most ready with help whenever anything was asked for. In August the enemy tried to destroy by air raid the 60,000 rounds of gun ammunition by then accumulated at Palmanova ; but though a big fire was started in the adjacent Supply Park, the Ordnance detachment contrived by smothering the burning materials to prevent it from spreading to their munitions. In this month also our force was increased by six more batteries, bringing the number of howitzers up to sixty-four, so as to take part in a fresh attempt on Trieste. This attempt never materialized as the Italians decided to remain on the defensive. The number of batteries was reduced to five, one of the forward ammunition dumps was closed and steps were taken to reduce the stock of ammunition to 20,000 rounds.

On the 13th October, 1917, however, with 9000 rounds of ammunition still to be evacuated, the movement was suspended, as news came to hand that a counter-attack was to be expected in which German troops would take part.

This German conducted attack opened on the 20th October with the usual preliminary bombardment and was pursued with great vigour. On the 24th, working round both flanks of Monte Nero, the Germans captured Caporetto, a key position held by Italian troops infected with communism, who made little or no attempt at resistance. They then pushed forward towards Cividale, threatening the flank of the Italian army in the coastal region where our artillery was engaged. By the morning of the 27th there could be no further doubt that the enemy had effected a complete breach in the Italian lines, necessitating a general retreat to the River Tagliamento.

At that time Mussolini had not yet arisen to rekindle the torch of Italian patriotism and revive the ancient spirit of Rome. The party in power had declared war on Italy's old enemy, Austria, from political motives, hoping to rectify an unsatisfactory frontier and gain territory; but the soul of the nation had never been stirred by the war. The army of Italy, an emotional race, had performed miracles in getting guns up precipitous heights and had certainly fought valiantly both in the mountains and in front of Trieste; but casualties had been severe and the war-weary troops, after thirty months of fighting without much to show for it, were not proof against reverse.

Panic developed. The retreat became a rout which the Tagliamento failed to check, and it was only after crossing the River Piave that a fresh stand was made; the attack having by then petered out because the enemy artillery had lagged far behind its infantry advance.

During this time our batteries, after firing off all their ammunition, had pulled out of action and taken the road to a rendezvous at Treviso; and there was nothing for the Ordnance to do but endeavour to save what it could and follow suit.

Here obviously the crux of the matter was transport, for which we were entirely dependent upon the Italian authorities. Every train was thronged with soldiers and civilians making their way to safety; the lorries usually allotted for Ordnance work had disappeared and no others could be got in spite of urgent appeals to Italian army headquarters. Two lorries only were forthcoming to remove the reserve howitzers, which were looked on as honoured guests; and some of the A.O.C., boarding these, succeeded in towing the equipments to Treviso in safety.

The workshop at Gradisca had to be abandoned on the evening of the 27th, and its staff, together with that of the ammunition dump and headquarter details got away by road, picking up a train later on.

The contents of the depot at Palmanova were all packed ready for removal by the same evening, the most valuable

stores being parked at the entrance ready for any lorry that might arrive ; but with the ammunition it was impossible to deal. By arrangement, this was left for the Italian engineers to destroy at the last moment—to set it on fire at this stage would have been disastrous, so crowded was the place with refugees. At 8 a.m. on the 28th, with the enemy reported in Udine to the north, the Italian authorities started to set fire to their own dumps in and around Palmanova. No lorries had arrived, trains had ceased running, and Hayley had no option but to give orders for the depot to be abandoned and the staff to find its way to Treviso.¹

The march of this little band proved a weary business. Most of the men were of low medical category, and those employed as clerks were in no condition to make a big physical effort ; while, to make matters worse, rain fell in torrents and the road was blocked with traffic. Codroipo was reached at 10 p.m., only to find that trains had also stopped running there, so that four more miles had to be covered to the Tagliamento and safety. But quite half the men were incapable of this further effort without a rest, and it was not until 7.30 the next morning that the river was crossed after a march of 25 miles in under 24 hours. Three more miles, taken very slowly, brought them to St. Vito, the first place where food could be bought and whence the rest of the journey could be covered by rail. But at Treviso there was a great shortage of food and, there being nothing further to be done for the time being, the whole detachment, now linked together, was sent to rest at Faenza.

Thus ended the first phase of our campaign in Italy.

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The defeat that has gained Caporetto such an ill name in Italy resulted in immense numbers of men being

¹ *In Scenes from Italy's War*, G. M. Trevelyan, who had charge of a British Red Cross Hospital, writes : "One part of our nurses had been accompanied by Colonel Hayley of the British batteries who, reduced like them to pedestrianism, had fallen in with them by the way and shown them the same friendliness that all the officers of the British batteries had always shown to the Croce Rossa Britannica."

captured by the enemy, and completely demoralized the Italian Army for the time being. All the mountain positions in the Alps up to which siege artillery had been hauled with such infinite labour had to be abandoned with their guns to conform to the new front on the Piave, the line now forming a quadrant round Venice.

It was at once decided to despatch a substantial body of French and British troops to assist in preventing a further break through and irruption of the enemy into the Italian plains. Our force comprised two Corps from the Second Army in France under General Plumer, who was accompanied by his army staff, including Hale his D.D.O.S., who became Director of Ordnance Services Italian Expeditionary Force, a post he continued to hold for the rest of the war.

After the retreat to the Piave the situation on the Italian front relapsed into comparative quiet; and the chief troubles with which the Ordnance were confronted were due to the strength of the force to be provided for and the length of its sojourn in the country being so uncertain, rather than to the severity of the fighting.

Two Corps had been hurriedly sent to Italy to save a critical situation, but an attack in strength by Germany on the French front in the following spring was already anticipated, to meet which it was likely that both might have to be recalled. Actually only one of the two was recalled in February 1918, but G.H.Q. Italy was warned on several occasions that it might have to part with more divisions, while on others it was proposed once more to strengthen the British force in Italy. Everything hinged on the development of events on the two fronts.

As our assistance was only expected to be of a temporary nature, the Italian Expeditionary Force was treated, for maintenance purposes, as a detached portion of the main body in France. The D.O.S. France had already estimated in his demands on England for its needs and continued to do so. The War Office ceased, except in special instances, to send stores direct to Italy, whose demands were met from the main depots in France. Directors were ordered to use the greatest economy in

personnel, stores and buildings; not more than one month's stock was to be held, while repair establishments were not to be started for any work that could be sent to France. For similar reasons, line of communication establishments were concentrated in the neighbourhood of Genoa, whence they could be easily evacuated. The whole intention, in fact, was not to commit ourselves further than was absolutely necessary.

All this uncertainty made it far from easy to organize an efficient service. The requirements of a force liable to sudden and violent fluctuation in strength could not be anticipated with any precision and initiative of every kind was cramped. Such accommodation as was at once forthcoming was accepted for Ordnance establishments and neither time nor money spent in equipping it adequately for the work to be done.

Experience soon showed that these provisional arrangements would not work. The first point that came to light was that it was impossible to carry on with such a small stock margin as one month's supply. It took goods far longer to reach Italy than had been expected. The distance over which they had to travel, stretching the whole length and breadth of France and a part of Italy, was immense; and the railway was already working at high capacity. Goods trains were continually sidetracked to make way for troops and travellers. The least hitch on the part of France in immediately complying with a demand or the least delay in transit, and the machinery failed to respond. Thus the base depot in Italy was perforce compelled by degrees to accumulate much more ample and varied stocks.

The proposal to undertake in Italy no repairs that could be effected by France proved even less practicable. Clothing alone, when sent there for renovation, absorbed a large number of trucks that could ill be spared; and it was a very costly business to send it all the way to Paris and back again when firms close at hand were capable of doing the work. Contracts were therefore entered into with firms at Milan and elsewhere for cleaning and disinfecting textile articles, for the making of wooden

tent bottoms and other items, and a substantial workshop was installed at the base. Thus, in the course of time, the Italian Expeditionary Force became just as self-supporting as any other.

The store depot was formed by Hayley at Arquata, with the aid of the Ordnance detachment already in the country, supplemented by extra personnel; while at Genoa, 20 miles to the south, a small transit staff was posted to receive and forward anything arriving by sea. Later on Lieutenant Colonel Smyth, who had accompanied one of the Corps to Italy as A.D.O.S., became Chief Ordnance Officer; and when it was decided to increase the stocks and do more repairs, there was great difficulty in finding the necessary space. The A.O.C. and A.S.C., who had also started business on a small scale, were crowded together and work was hampered by cramped conditions.

Once more, as in so many other theatres, the importance of making ample provision for expansion when planning a new depot in time of war was shown.

It was the same with ammunition, first dumped by the side of the railway at the small village of Ovada, 15 miles to the east of Arquata. The site was utterly unsuited for an ammunition depot, the available space was inadequate, and as soon as possible a properly constructed depot was built at Rivalta Scrivia, some four miles south of Tortona, the headquarters of the Italian lines of communication. It was a great relief when the stock was all safely housed in these premises where it could be properly safeguarded, as warning had been received from the Italian Government of anarchist threats to destroy trains and dumps of ammunition.

But the building up of substantial depots at Arquata and Rivalta Scrivia with the usual concomitant establishments for repair and salvage was not the only extension needed. Both were tucked away in the north-west corner of Italy while our troops were operating near the opposite coast, 250 to 300 miles away; and an organization further forward became imperative to cope with the more vital and urgent services. At Padua, General

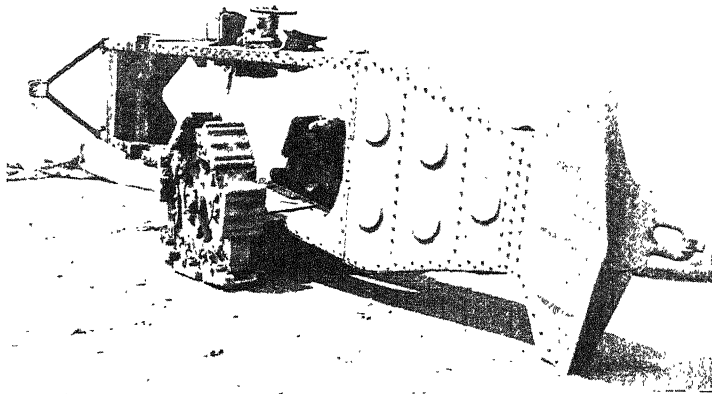
Headquarters, a substantial dump was formed to hold reserves of important stores, with a gun park and workshop.

In fact the whole organization as originally conceived had to be remodelled as our stay in the country was prolonged, though only three divisions remained. What was to have been merely a temporary advanced base became a base; and a fresh advanced base was thrown out at Padua. This, however, was only small and was fairly mobile, being organized on the same lines as the Ordnance establishments of an Army in France.

Besides its own line of communications, which ran from west to east right across the north of Italy, the Italian Expeditionary Force became responsible for the portion of the Mediterranean line, 1000 miles in length, stretching north and south from the French frontier to the foot of Italy. Indeed a substantial part of the business of Lieutenant Colonel Sheppard, D.D.O.S. L. of C., lay in organizing Ordnance services along this route, equipping rest camps and halting places, particularly at Taranto, the terminus, where there was a depot to house goods in transit for the east and to provide for troops waiting embarkation or on their way home.

The other outstanding feature of this campaign, from an Ordnance point of view, was due to our troops being at times in the plains and at times in a region of precipitous, ice-clad mountains. Varying conditions had to be provided for, khaki clothing and sun helmets on the one hand, fur garments, fur-lined trench slippers and sleeping bags on the other. Mountain warfare introduced many novelties in equipment. Our ordinary transport was unsuitable and had to be modified or exchanged for pack-saddlery, while alpenstocks and ice-axes, snow-shoes and skis, sleighs¹, ice grampons, splinter-proof goggles as protection from rock fragments, non-freezing oil, special mule-shoes and heavily nailed boots were needed.

¹ 1000 of these bobsleighs had been sent to France from Canada early in the war but remained, an incubus, at Havre until it was thought that they might be of use in Italy. Eventually they found their way to North Russia.



ITALIAN TRANSPORTER ADAPTED TO CARRY TRAIL OF SIX-INCH
HOWITZER



MUZZLE PORTION OF SIX-INCH MORTAR AS A MULE LOAD

Lastly the final operation, in which the Piave was recrossed, entailed the provision of several thousand life-jackets and long waders, with quantities of bridging material.

Nor was the technical staff of the A.O.C. without its special problems, although guns were not exposed to the severe strain of intensive firing and ammunition expenditure was comparatively small. The fact that snow was prevalent in some localities in winter gave plenty of work for those engaged on ammunition duties, for snow is far more insidiously penetrating than rain. All our guns that took part in the retreat from the Isonzo needed a thorough overhaul before they were once more ready for action; and 120 complete six- and eight-inch howitzer equipments, presented to the Italian army to replace what they lost in the retreat, had to be assembled and their officers instructed in their care and in details of the ammunition by technical officers of the Corps.

The most notable feat consisted of improvising means of transporting artillery in the mountains. As a basis, the Italian army supplied us with transporters of its own type, and these had to be modified to suit our own equipments—18-pdr. and 60-pdr. guns and six-inch howitzers; the gun and its carriage being parted and divided into two or more loads according to weight. Moreover it was considered that our six-inch mortar would be a very efficient mountain weapon, as the height of its trajectory enabled it to search out reverse slopes and deep ravines that no howitzer could reach. But this equipment was immobile in such regions without pack transport. The mortar itself therefore, 170 lbs. in weight, was cut in half, the two pieces were joined by an easily removable collar with gas-tight joint, and the bed, which formed a third load, was greatly reduced in weight; other loads comprising ammunition and appliances. Not only had the equipment to be transformed in this way but special pack-saddlery was needed to carry it; design and manufacture being all the result of local improvisation. This extemporized heavy mountain mortar equipment

was quite a success ; its accuracy was unimpaired by this surgical operation, fifteen miles was a normal day's journey, while one section climbed 1200 feet over difficult ground in forty-three minutes.

For the last operation on this front, in October 1918, our one Corps remaining in Italy was split up ; two of its divisions were incorporated in the 11th Italian army—commanded by our Corps Commander—while the third formed part of the 6th Italian army ; and this mingling of forces naturally made the work of those engaged on supply services more difficult. But by then there was no heart left in the Austrians and victory was soon assured, an Armistice being signed on this front on the 4th November. Then followed for the A.O.C. the lengthy and tedious process of demobilization, which needs no description, for the lines followed were similar to those elsewhere.

CHAPTER XVII

RUSSIA AND SIBERIA

THE treaty of peace, framed at Brest-Litovsk in March 1918 between Germany and the Russian Revolutionary Government, was a very serious matter for the Allies. That front contained large enemy forces of whom it was highly important that the fewest possible number should be set free to fight elsewhere. In the past Russia had been supplied with munitions by the Allies and it was decided to continue aid to such portions of the Russian armies as were prepared to continue the struggle.

Moreover a substantial body of Czecho-Slovaks had taken the opportunity of the war to throw off the hated Austrian yoke and desert to Russia, where they were now joined by many fellow countrymen hitherto prisoners of war. These elected to form themselves into a Czecho-Slovak army and fight for the Allies, with a view to establishing their nationality as a Kingdom independent of Austria. Such was the distracted state of the Russian Empire at the moment that this comparatively small body actually controlled a large part of Siberia, and it was necessary to give it moral and material support.

Apart from individuals however, to act as instructors, few men could be spared while the war was raging. When it was over the Allied Peace Council at Paris decided to continue the fight against the poison of Bolshevism, a negation of all that modern systems of civilization stood for—one that repudiated not only all religion, but liability for external loans and concessions to foreign capitalists entered into by the former rulers of Russia. But the statesmen of the various Powers, great and small, gathered together at Paris to form a League of Nations, set the world aright and establish universal peace, had too much else to think about to trouble their heads greatly about Russia; and the war-weary conscript could not be expected to remain under arms on foreign soil to support a cause that interested him not in the least. The only policy pursued with real vigour lay in continuing

the supply of munitions of which there was then such a superabundance.

All these efforts were in vain. The revolutionary virus had penetrated far too deeply among the uneducated masses of Russia to yield to such treatment. The moujiks, among whom the vast estates of the Russian nobility were to be divided, hoped to benefit by becoming land-owners; the town-workers looked forward to improved conditions of life, higher wages and shorter working hours under a communistic regime. Not till later were these bright prospects of what was expected from a policy of confiscation discovered to be an empty mirage.

Russian officers, again, as a rule did not take their profession seriously. Corruption had always been rife, discipline was undermined by the revolution and they neglected their men. There was no cohesion in the forces we were at pains to outfit and no heart in the conscript peasant who turned "White" or "Red" according as he thought would serve him best at the moment, and deserted at the first convenient opportunity. From north, south, east and west we sent missions, munitions and supplies of every kind, but one after another the anti-revolutionary armies became tainted and melted away almost as quickly as they were formed.

* * * * *

In August 1918 a Military Mission was sent to Siberia accompanied by Lieutenant Colonel C. J. T. Robertson with two men of the A.O.C. from Hong Kong. A depot was established at Vladivostock and eventually the strength of the Corps in Siberia rose to 5 officers and 68 other ranks. Storeships began to come out in October and during the ensuing twelve months 79 vessels arrived bringing 97,000 tons of arms, ammunition, stores and clothing. In addition large Russian stocks of equipment, boots and clothing were taken over in various parts of Siberia, and fur clothing and under-clothes were purchased on the spot.

In all it may be said that an army of 200,000 men was fully equipped, clothed and provided with rifles, machine

guns, field artillery, wireless, telegraph, and signal stores, transport wagons, harness and saddlery; in fact everything needed to enable it to take the field. Among the items handled were 346 million rounds of small arm ammunition, 435,000 blankets, 210,000 sets of clothing, 400,000 sets of Russian under-clothes, 300,000 pairs of boots, one million hand-grenades, 725,000 field dressings, 44,000 sets of harness and saddlery and 1,200,000 pairs of horse-shoes.

Depots were opened at many points along the Siberian railway, of which the most important were at Omsk, Kurgan, Tomsk, Ekaterinburg and Irkutsk; but these were little more than transit stations which transferred to Russian custody what was sent up from Vladivostock.

There were many difficulties to be contended with—the extreme rigour of the winter when the thermometer would drop to 40 degrees below zero, insufficiency of storage accommodation, the heterogeneous nature of the labour employed, much of it composed of prisoners of war and each nationality speaking a different language, labour and railway strikes and shortage of rolling stock. Russian officials too were as a rule incompetent and apathetic, if not actively obstructive; and were apt to look on our stores as a useful means of getting anything they fancied for themselves.¹

¹ *Order from the Head of the Staff of the Commander-in-Chief and Minister of War.*

No. 914.

August 27th, 1919.

OMSK.

Acting commander of the 2nd motor transport division, Staff Captain Samoilovitch, forwarded to the Kurgan district Ordnance Store in the military zone an indent dated 10th August, 1919, No. 3085 for the supply of sundry stores for officers and civil employees of the above mentioned division. Among the supplies asked for were 295 yards batiste, cigars 350, candy 58 lbs., ladies' stockings 5 dozen, cloth for ladies' dresses 30 yards, scented soap 85 tablets, eau-de-Cologne 27 bottles and scents 29 bottles. The signers of the indent, commander of the 2nd motor transport division, Staff Captain Samoilovitch and his assistant, Lieut. Oripoff, to be removed from their appointments and returned to their

Promises were made only to be broken, and looting was common up and down the line. During a two-day revolution at Vladivostock in November 1919, many of the revolutionaries were found to be dressed in our uniforms and armed with our rifles, among whom were even recognized men employed under the British Mission.

By this time the Bolsheviks held such a mastery over the country that it began to be realized that more harm than good resulted from sending consignments up the railway, the probability being that the goods would be looted and a few find their way into the hands of friendly Russians. It was therefore decided to withdraw the Mission. The majority of the Ordnance detachment left in November, and Robertson followed in January 1920. Such arms, clothing and equipment as remained in stock were handed over to the Russians at Vladivostock and other oddments disposed of by sale. The mainstay of the depot at this time, curiously enough, consisted of German and Austrian officers who, together with a number of Czecho-Slovaks, had been working for us. Despite language difficulties, ignorance of our methods, nomenclature and so forth, these officers worked splendidly as clerks, foremen, guards, etc., and their services during the evacuation were invaluable.

When the Soviet finally captured Vladivostock in February 1920, its troops were clothed in our uniform, armed with the rifles we had supplied and its field guns had painted on them the Union Jack.

On March 6th, 1919, there landed at Novorossisk, a port on the Black Sea east of the Crimea, Lieutenant Colonel De Wolff, A.O.C., with an Ordnance mechanical engineering officer and another for ammunition duties, one armament artificer, one armourer, one clerk and one storeman, as part of a Mission sent to assist General

regiments; the countersignee of the indent Military Clerk Putschkoff to be removed from his appointment and if of conscript age to be enlisted, or if over age to be dismissed the service.

Lt General of the General Staff, Deidericks.

Orderly General, Maj-General Kondrashoff.

Denekin, Commander-in-Chief of the Russian anti-revolutionary forces of the South.

As in Siberia, this nucleus was intended only to advise the Russians and aid them in their dealings with British equipment, but here likewise it had to undertake a whole range of executive work ; for, although warning had been sent that quantities of stores of all sorts might be expected almost immediately, the Russian staff had made no arrangements to deal with the goods when they arrived.

Other branches of the Mission proceeded up country to Denekin's headquarters, and De Wolff was left to cope with the situation at Novorossisk as best he could with the assistance of the British Consul, through whose good offices an excellent set of sheds and railway sidings belonging to one of the largest granaries of South Russia were acquired as a depot. But that was as far as he could help. The site was three-quarters of a mile from the docks and neither labour nor transport were forthcoming in anything like sufficient quantity to handle and convey to the depot goods, of which 19,000 tons arrived during the next six weeks, the figure eventually rising to 77,000.

Large numbers of railway trucks had been captured from the Red army, but instead of being set aside for their legitimate work, they were used by officers and refugees to house their families, who could apparently not be made to stir. Whenever some official from Denekin's headquarters came down to investigate a complaint, the railway staff would produce a goodly show ; but as soon as his back was turned the wagons vanished again.

Such able-bodied men as had not been drafted into the army, even if not Bolshevik at heart, showed no inclination to work for Denekin who, with no men to spare, had been unable to garrison Novorossisk, put the town under martial law and commandeer labour. The only real keenness displayed by the Russian labourer was when handling clothes or boots. When told to load a truck with ammunition he would, as like as not, walk off. Guards were posted, but they were useless ; the Russian sentries frankly owned they were afraid to arrest a thief lest they

be murdered. Meanwhile store-ships had to be cleared to fetch fresh cargoes ; and their contents, very valuable to the civil populace, were strewn about the quays ; the inhabitants removing such loot as they fancied and were able to carry off.

Nevertheless, by dint of hard work on the part of this minute Ordnance detachment, increased from time to time by a few individuals, matters were gradually straightened out ; but it was not till the following December, when a strong reinforcement arrived which brought the strength up to 18 officers and 101 other ranks, that the numbers were really sufficient ; and by then the back of the work was broken.

Any attempt to keep written records in the accepted sense had been out of the question with a clerical staff of one, and arrangements were made with the Russian authorities whereby they accepted responsibility for everything consigned to them on our assurance that it had been handed over.

It is satisfactory to be able to record that the results achieved by this small body were appreciated. Major General Sir W. Rycroft, Quartermaster General of the Army of the Black Sea, who visited the depot and quays in April reported : " I wish to place on record the exceptionally good work that has been done by so small a staff at Novorossisk. The Ordnance staff have done their best to reduce order out of chaos " ; and General Denekin, after an inspection in June that lasted three hours, congratulated the personnel of the Corps on the satisfactory way in which his troops were being supplied with clothing, guns and ammunition.

To take over on the quays and house the goods had indeed been only the first part of the programme ; they had next to be got into the hands of the Russian troops, and to effect this, the plan first tried was to use as a medium the Russian Intendance whose regular duty it was to clothe and equip the soldier. But this body proved to be bureaucratic to an extent only approached by our own similar semi-military officials at the Crimean War. They would come to the depot represented by a Commis.

sion of fourteen headed by a major general; and to obtain goods from their warehouses a Russian regiment had to get the signatures of five or six different officials, who were never to be found on the spot all at the same time.

One of the first issues made to the Intendance comprised several thousand pairs of boots. The fourteen arrived, the stacks of packing cases were pointed out to them and they proceeded to smash open each case to count its contents.

The futility of such action was pointed out but apparently to no purpose. Shortly after there was a cry for horse-shoes which had been handed over to the Intendance all nicely packed in cases, each with a tin containing the right quantity and size of nails for the shoes it held. On this occasion a Russian staff officer went with De Wolff to see what was the matter and why the horse-shoes could not be got. There in the centre of the Intendance warehouse was found a mountain of loose horse-shoes and the boxes broken to pieces in a heap in one corner. They were laboriously counting the shoes and stringing them together in tens; while in the next shed they had tipped out all the nails from the tins, had counted them one by one, and tied them up in bundles of 50. This was the reason why cavalry horses were unshod and immobile.

These instances are typical; it was impossible to get practical results out of such a hopelessly incompetent set of functionaries, and it was next decided to try and reach regiments direct. Under this scheme, complete sets of various classes of articles were made up, and in particular of clothing. Thousands upon thousands of Russian troops were suffering from typhus, and the only chance of getting rid of the lice that carried the disease was for the man to strip from head to foot and, after discarding his rags and disinfecting his person, to clothe himself entirely anew. When so many sets of clothing or equipment were ready, Denekin's staff was informed and settled the allotment among his various forces—Volunteers, Kuban Cossacks, the Ural Army, the Don Army

or that of the Caucasus. A representative from each force then came and drew his quota from the depot at Novorossisk, finding his own transport and labour.

But still much failed to find its way into the hands of the troops owing to looting and delay *en route*, so scheme number three was evolved—the only one that worked satisfactorily. Complete train-loads were made up for each army, filled from all services—R.E., A.S.C., Ordnance and Medical—and sent forward in charge of a British officer who saw that the contents actually reached their destination and were delivered to those for whom intended. In all something like 350,000 men were clothed and equipped in this way besides 12,000 hospital beds.

Guns of all kinds were handed over to a Russian artillery depot situated alongside the quays at Novorossisk. It was found, however, that the Russian artillery officers, although very keen to understand the working of our guns, were hopelessly at sea and got everything into confusion. They mixed up all the gun components and the harness and saddlery. Some British gunners were accordingly stationed at the artillery depot to help in assembling the equipments. An armament sergeant major A.O.C. was also attached and overhauled the guns before they were despatched to the front, with such assistance as could be given by the Ordnance depot. This worked well, and batteries, complete with their harness and spare parts, were sent up country all ready for action. Something like a thousand guns of all calibres, from 18-pounder to eight-inch howitzer, were handed over in this way.

It was the same with machine guns, of which the Russians confused the parts of the Vickers and Lewis, until a machine gun school was formed under the superintendence of the British Mission. Several thousand of both sorts of machine gun were issued to this school, which taught the Russians how to use them.

Ammunition was the most difficult problem of all. The Russians knew practically nothing about British munitions and the task of teaching them was not easy. But Major Donovan, the ammunition officer, one of the

original Ordnance contingent, worked heroically and things gradually took shape. It was hoped at first to form a base ammunition depot at Novorossisk, but the temper of the populace and loyalty of the troops there were uncertain; and, from motives of mistrust, Denekin decided to scatter the ammunition up and down the country. It was loaded up at the quay side; but the railways were disorganized and no one seemed to have any definite idea where any particular lot was destined to go to. Civilians seeking a ride clambered on to the loaded wagons, and among this dangerous freighting the Russian military escorts lay on straw, lit fires and smoked.

No fewer than fourteen permanent ammunition depots were formed, besides temporary ones; and these Donovan had to visit, to try and enforce some elementary precautions against damage. They were as a rule dangerously overcrowded, and the only cover was furnished by Nature—three or four feet of snow in winter, nothing in summer. Dunnage was seldom provided to keep packages from contact with the damp ground, while there were few if any fire-appliances. However, by means of lectures delivered through the mouth of an interpreter, and pamphlets, Donovan gradually established better order.

A light mobile workshop arrived from Salonika at the end of March 1919, but months passed before it was sent up country, actually because the Russian staff would not allot it to any particular army for fear lest the others be jealous. It was only in June, when two more (a medium and a light) arrived, that the three went forward. One was then established at Rostov on the Don, while the other two, mounted on railway trucks, had their headquarters respectively at Kharkov and Tzaritzin. Besides their British personnel, the staff of these shops included some 60 to 120 Russian workmen under a Russian colonel, who did the less highly skilled repairs; and they had to deal with a great diversity of work, armoured trains and mechanized tractors mounting Russian guns in addition to British equipments.

For a time fortune smiled on Denekin. Good English

clothing and the expectation of food and loot were no doubt powerful magnets in attracting the half-starved peasantry to his standard ; but the further he advanced, the more his troops became scattered and disintegrated. With no real fighting spirit and no leadership, they began to think there was nothing more to be gained by staying with him and deserted, either joining the Bolshevik forces or going to their homes. The pressure of the Red armies was thus automatically increased ; and during the winter of 1919-20 the remnants of Denekin's army were forced to retreat into the Crimea, accompanied by some hundreds of thousands of refugees.

Novorossisk was finally abandoned on March 26th, 1920, just a year after its first occupation. At that time the depot held 1500 tons and there were besides over 4000 tons, mainly of ammunition, on board two ships that had just arrived. In anticipation of a move to the Crimea the most valuable goods had already been taken to the quay-side ready for any ships that might be available ; but much of the rest, and a large quantity of ammunition handed over to the Russian artillery for despatch up country, was lost, there being no means of getting it to the quays. Much anxiety was felt on account of one of the mobile workshops which, fortunately, arrived just in time for its personnel to be evacuated though its equipment could not be saved.

After leaving Novorossisk the Ordnance established themselves at the ancient Crimean city of Theodosia. Some 500 tons were off-loaded, when on April 8th orders were received to transfer the depot to Sevastopol which was reached two days later.

Here, under instructions from the British Mission, the original scheme for supplying the troops was reverted to, and everything sent out for their use handed over to the Russians in bulk to deal with as best they might. It was doubtless felt that, in view of the military situation, we should not commit ourselves further. But the plan proved disastrous for ammunition. In spite of a number of protests pointing out the danger, it was left to accumulate on the quay where it had been transferred to Russian

custody and eventually exploded with the loss of the whole 4000 tons.

A large reduction was made in the strength of the Corps after leaving Novorossisk, for there was now little work to be done beyond handing over such goods as continued to arrive, a dwindling quantity. Though hostilities dragged on for a few months longer, the futility of attempting to bolster up a losing cause became ever more evident until finally, at the end of June 1920, the Mission was broken up and the last of the Ordnance personnel, now reduced to fourteen all told, sailed for home, leaving behind what stores remained for the Russians to make such use of as they could.

In the Baltic our efforts were confined to handing over goods at the ports of entry—Reval for the newly formed State of Esthonia and the Russian army of the north-west under General Yudenich, and Riga for the States of Latvia and Lithuania, all of which were at war with the Bolsheviks. At each place a depot was formed under an Ordnance officer with a few A.O.C. and A.S.C. men who gave what arrived to representatives of the various forces. Upwards of 100,000 sets of equipment and clothing were in all distributed from these two depots together with rifles, machine guns, guns ranging from 18-pr. to six-inch howitzer and ammunition.

But it was all to no purpose. Riga was attacked, the depot came under the enemy's fire, the remaining rifles and ammunition were issued to the local forces to aid in the defence of the town, and the rest of the stores removed to a temporary depot at Wolmar while Riga was being bombarded.

Thus ended our attempt to comfort the anti-Soviet movement in the Baltic.

The North Russia Expeditionary Force, which sailed from Newcastle in June 1918, was on a more ambitious scale. In this all the Allies participated to some extent, sending troops which, sweeping southwards, were to

establish contact with other loyal Russians and strike at the heart of Bolshevism.

This expedition was based on Archangel, the main Russian port on the Arctic Ocean, situated on the White Sea at the mouth of the River Dvina. The entrance to the White Sea, however, is narrow and blocked by ice throughout the winter and during the war Russia had built a thousand-mile railway to Murmansk on the Murman coast, an ice-free port, so as to obtain supplies throughout the year. It was feared that Germany might establish a submarine base at Murmansk, which was within easy striking distance of Scapa Flow, the headquarters of our battle fleet, and a semi-independent expedition was, therefore, sent there at the same time.

It would seem that we were badly served by our intelligence service for the situation proved very different from what was anticipated. In place of rallying round the standard, the sympathies of the inhabitants were in reality Bolshevik ; they were only nominally friendly so long as it enabled them to carry on their business in peace. Some of the regiments we raised, equipped and clothed, mutinied and went over to the enemy after murdering their officers. There were even overt attempts at mutiny in Archangel itself, only overawed by the presence of our own troops. In place of receiving an ovation, we came near to having to make a forced landing. The inhabitants acted as spies, our friends of one day might be our foes of the next, and the psychological atmosphere was so surcharged as to make the situation very difficult.

It was understood that we should find large resources of munitions supplied in the past to Russia, with an abundant staff of loyal Russians only too willing to help ; and that nothing would be wanted from home beyond a small supervisory Ordnance staff to act as instructors, with certain supplies of special equipment and clothing. Thus Colonel C. T. Fisher, who was detailed for the Archangel Force, was accompanied by only three officers, one warrant officer and 19 sergeants including men of various trades, with certain stores : while Lieutenant

Colonel Hickson, detailed for Murmansk, had with him one officer, 11 other ranks and no stores.

These expectations were not fulfilled. The Bolsheviks, who evacuated Archangel on the eve of our arrival, certainly left behind a collection of goods that they were unable to remove, but nothing like what was wanted to equip an army. Apart from manual labour, we had to depend on our own resources. The expedition first touched at Murmansk, where it was found necessary to land much that was intended for Archangel, and the very first step that had to be taken when the latter port was reached was to despatch home large demands for stores of all sorts and personnel to deal with them, so as to ensure arrival before the winter set in.¹

The expedition (writes Colonel Fisher) comprised a great variety of nationalities—British, French, Americans, Italians, Russians, Poles, Finns, Serbs and Czechoslovaks. This made Ordnance services particularly difficult to administer; for though the French, Americans and Italians brought out their own supplies, we often had to provide for their needs.

As a rule stores were demanded by, and supplied to, a force which comprised a large number of very small units of several nationalities, and it was impossible to keep any proper control or adequately check the demands made on us.

G.H.Q., together with the offices of all directorates, established themselves at Archangel, on the right bank of the River Dvina; the Ordnance base depot being at Bakaritzza, some four miles further up the river on the left bank. In September and October 1918, ships began to arrive with stores and drafts of Ordnance personnel from England consisting of 15 officers and 108 other ranks, reinforcements which were badly wanted owing to the

¹ A point worth noting from a departmental point of view is the confusion caused by the Archangel force being allotted the code word "Elope" and Murmansk "Develope." Packages were marked accordingly, and when marks became obliterated it was easy to mistake one word for the other. So much trouble did this similarity cause that the code word Syren was substituted for Develope.

expansion of the campaign. Besides strengthening the staff at the base depot, this influx enabled forward depots to be established at Bereznik, Yemetskoe, Kholmogori and Onega, a matter of no little moment in view of the approach of winter. The three first named were all on the River Dvina—Bereznik, the farthest afield, being 200 miles from Archangel; while Onega was on the coast and reached by sea.

The importance of opening and filling these advanced depots will be readily appreciated when the conditions of transport in North Russia are realized. In the summer stores could be transported to the up-river depots by barge in bulk, though there was a persistent shortage of tugs and barges; but during the winter, when the rivers were icebound, sleigh traffic, in view of the very small capacity of the sleigh, was wholly inadequate for the conveyance of large quantities.

Towards the middle of October the general distribution of winter clothing took place; a kit designed by Sir Ernest Shackleton, the Antarctic explorer, which, with one exception, proved extremely serviceable. The articles consisted of blouse, hood and trousers of a light-coloured burberry material, moccasins for use with snow-shoes, fur caps, sheep-skin lined coats, mufflers, sweaters, mitts with gauntlet cuffs, Canadian lumberman's stockings, thick socks, snow-goggles and boots with no iron in their construction. But the boots had a smooth leather sole, making it very difficult to walk on beaten snow and quite impossible to run, and they would not bear comparison with the Valinki boot worn by the Russians (a fact also reported by our Mission in Siberia). This was a knee-boot made entirely of blocked felt, thickened at the sole. Properly cared for it was extremely warm, comfortable and durable. The snow being always dry and powdery could be easily shaken off and, provided they were not worn indoors, a good pair of Valinki boots would last a whole season.¹ It was, however, impossible

¹ Scott also speaks highly of the Russian felt boot during his stay in the Antarctic. "For ship wear there are some warm, comfortable slippers provided for both officers and men, but many prefer to remain

to get enough for our troops as well as for the Russians and eventually leather or felt strips had to be nailed to the sole of the Shackleton boot, destroying its special feature by introducing a metal heat-conductor and making it essential to use a felt inner sole or sennegrass as a safeguard against frostbite.

With so many depots to be stocked, and the difficulty of foreseeing what troops would be supplied from each during the coming winter, stock margins were very small, especially for winter clothing, ammunition and the means of lighting during the long hours of darkness, for the sun rose at 11.30 a.m. and set about 2 p.m. in mid-winter. Happily there was a thaw after the first freezing of the upper reaches and it was not until the early part of November that the river finally froze over at Archangel. It is worthy of note that the only shortage that caused an enormous outcry was that of padlocks to prevent local pilfering which, up and down the country, was one of the greatest troubles we had to contend with.

Sleigh routes were then most ably organized by D.D.S.T. (Colonel R. P. Crawley), affording a daily lift of about ten tons from the base for all services exclusive of food supplies.

During the winter, thanks to the particular type of Russian stove which is built between each pair of rooms, and to the fact that all windows are double with an intervening air space of some six inches, no discomfort from the cold was experienced indoors; indeed the majority of houses were almost too warm. The extreme cold expected was about 40 degrees below zero but 30 degrees below was experienced only twice, and that for only

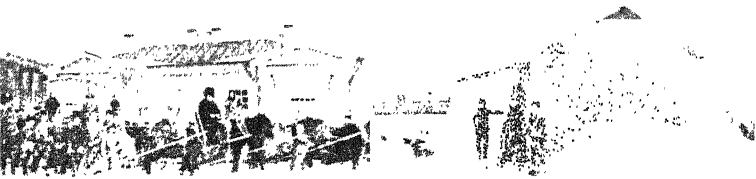
in their Russian felt boots. These were specially obtained from Russia at a very small cost, and are perhaps the most satisfactory footwear we possess for general purposes, now that we have modified them to suit our requirements. The modification consists in adding a sennet sole made from ordinary spun yarn and secured to canvas which is closely fitted and sewn to the boot; by this device the felt of the boot is protected from wear, and our people are able to do a great deal of work both inside and outside the ship in this comfortable footwear." *The Voyage of the Discovery*, Vol. I, p. 243 *et seq.*

two or three days on each occasion, the average temperature being about 10 degrees below zero. Preparation had to be made in the storehouses for the rigours of winter. Owing to the shortage of R.E. personnel, this work was mostly done by the Russian natives under Ordnance direction. A portion of each shed was double-lined with wood, the space between filled with sawdust, and small stoves put in these compartments. This enabled clerks to work and storemen to pack.

Workshops were established at the base and at Bereznik, where a barge was fitted up with machine tools. Large numbers of skis and sleigh-runners were made and the armament to be attended to was of the most varied nature, comprising British, French, Italian, Russian, American, Austrian and Japanese guns, all of which we had at times to overhaul and repair, besides attending to their ammunition.

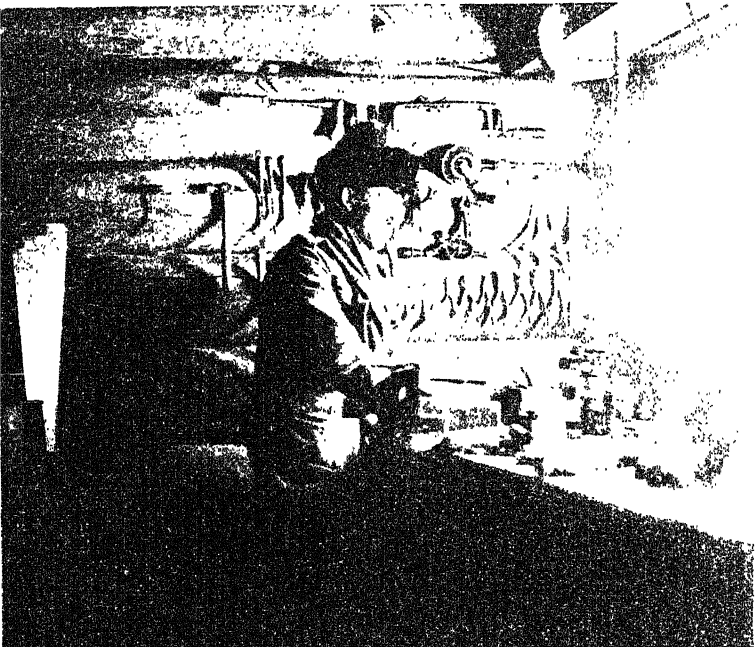
During the winter, difficulty was experienced with the non-freezing buffer liquid supplied from England, the tins holding this liquid being found to contain lumps of solid matter. Mixtures of oil and turpentine were tried, and a mixture of two parts of oil and one of turpentine was found not to freeze at minus 76 degrees and gave the most satisfactory results as a buffer liquid. For lubricating purposes, a mixture of one part of oil and one part of turpentine was found to be more satisfactory than the lubricating oil received from home. The low temperature also had its effect on cordite; ranges were greatly reduced owing to the nitro-glycerine exuding and experiments were made with warmed charges which mitigated this defect to some extent.

In the autumn, four 60-pounders were ordered from England. With the greatest difficulty the ship which brought the guns was got through the ice and the guns off-loaded, but the dial-sights for these equipments could not be found. The ship carrying the ammunition was never heard of again after leaving England, and it was presumed the sights were shipped in her with other components and spare parts. A further supply of ammunition arrived in replacement, but no dial-sights. Hence,



SLEIGHS LEAVING ORDNANCE
DEPOT FOR THE FRONT

AMMUNITION SHED, ONEGA



MAKING IMPROVED DIAL SIGHTS DURING AN ARCTIC WINTER

when these guns, which were badly wanted for use against the enemy's long range artillery, were at length got up to Bereznik by sleigh, the sights for them had not come to hand. The D.A.D.O.S. Dvina Force, Major Croydon, with much ingenuity designed an emergency sight for these guns, constructed from parts of other sights. The sight was made up by Armament Staff Sergeant Hadley A.O.C. with such success that, on trial, a direct hit was obtained on a target. To carry out the work, Hadley had only a bench in a local hut and a very meagre supply of tools. For this achievement he was granted an immediate award of the M.S.M.

Owing to the river above Bereznik becoming free from ice about a fortnight before traffic would be possible from Archangel, it was proposed to build at Bereznik two rafts, on each of which was to be mounted a 155mm. howitzer to be ready in case of attack by the Bolshevik flotilla on the breaking up of the ice in the upper part of the river. The rafts were designed by a Russian engineer and the materials—planks, iron work and turntables for the guns which were mounted on field carriages—were made at Archangel and sent up to Bereznik by sleigh route for assembly. The rafts were completed and the guns mounted to time, but the rafts did not prove a success from a towing point of view.

There was desultory fighting south of Bereznik during the winter, but in the spring the country became quite impassable owing to the melting snow and ice. The intention had been, when it became once more traversable, to undertake a big offensive against the Bolsheviks on the Dvina front. Denekin was making good progress at this time and it was hoped to make contact with other troops under Admiral Kolchak who were advancing from the east.

Administration of the districts right and left of the river was transferred to the Russians who took over our depots at Yemetskoe, Kholmogori and Onega, while we retained Archangel and Bereznik. G.H.Q. moved up to Bereznik which became the centre of activity, the

Ordnance depot there was expanded and rifles and ammunition were collected for the use of Kolchak.

But the fates decided otherwise. Denekin's bolt was soon shot and Kolchak, instead of advancing, had to beat a retreat. The whole of the Onega district went over to the Bolsheviks, exposing that flank, while the other threatened to follow suit.¹ The Supreme Allied Council recognized the futility of further action in this quarter and ordered the complete evacuation of North Russia. Bereznik was abandoned in July. G.H.Q. returned to Archangel and the expedition, with its munitions, sailed for home in September 1919.

Meanwhile the course of events at Murmansk had been very similar. Immediately after our arrival, writes Hickson, small forces were sent south, one to Kem and one to Kandalaska, and a small Ordnance detachment was sent to Kandalaska to supply these two forces. Along the northern coast of Russia, westward, there is a small inlet almost on the Swedish frontier, and in this inlet is situated the town of Petchenga, fifteen hours distant from Murmansk by sea. It was considered necessary to garrison this town, which would have been a very suitable place for a German submarine base, and some of the Murmansk infantry were accordingly sent there.

An Ordnance depot was opened to supply the infantry and other Russian and local units who formed part of the garrison, the stores being sent from Murmansk in small coasting vessels which could not go up the river

¹ The Ordnance detachment at Onega had some exciting experiences. On the 21st July, the depot was attacked by the Bolsheviks during the night, and Captain Fox, Ordnance officer in charge, finding resistance against overpowering odds useless, surrendered after Sergeant Doggett A.O.C. had been mortally wounded. The British garrison was confined in one filthy and verminous cell and two days later was marched off on the way to Moscow under escort together with a party of loyal Russians. Then a British Monitor came up the river, threatened to bombard Onega, landed a party of marines and bluejackets and rescued the party.

On the 20th July the British at an outlying spot at the front, Chevuko, including Sub-conductor Triggs A.O.C., were overpowered and, after six days confinement in the local gaol, were sent under escort to Moscow and confined there. They were eventually set free by diplomatic action.

where the garrison was stationed, so that two transshipments had to be made before the stores could be landed at the quay side.

The question of workshops for the force was a difficult one for some time until a large repair ship, the *Xma*, which had been commissioned for the use of the Russian fleet, was found. This was commandeered, Ordnance artisans were put on board, and they worked at repairs side by side with the Russians. This ship was fully equipped for general engineering with foundry, lathes, milling and drilling machines, etc. A workshop repair train was also formed which had five or six shops for carpenters, armament artificers, tailors and shoemakers, and plied up and down the railway line between Kem and Murmansk, doing repairs where required.

Towards the end of 1918 some Italian infantry, an Italian ski-ing unit and more French troops arrived, all of whom drew stores from us; and it was necessary to be very well equipped with interpreters to understand some of the extraordinary demands of these foreign units, who were spread out over the field of operations and indented on our depots wherever they happened to be.

Large numbers of Russian rifles and machine guns were captured during July and early August, and on the 11th August the whole force was served out with Russian rifles, machine guns and .762 ammunition. This was done as it was hoped to join up with Kolchak whose troops had these rifles and ammunition; and it was thought that confusion might arise if two calibres were used in one theatre of operations.

Large quantities of Roumanian gun ammunition, acquired in various parts of the area of action, were sent to Murmansk, and it was a great puzzle to know what to do with the truck loads that arrived. Eventually an ammunition dump was formed on the hill outside Murmansk on the main railway line. Sidings were constructed so that these trucks could be unloaded, and Russian labour was used for handling the big gun ammunition.

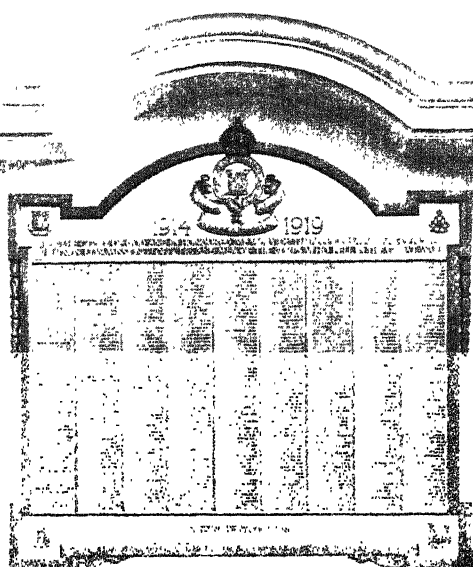
Some of the means of conveying stores from place to place were novel and possibly had not been used in civilized warfare before. In some parts reindeer and dogs were used in conjunction with sledges, and after the first three months there was very little transport except by sledge.

During February and March 1919 the forces gradually moved south, Kem became general headquarters with Medvegia Gora as advanced headquarters, and the main Ordnance depot was formed at Popoff, which is the port of Kem on the White Sea. Stores still arrived at Murmansk, and were forwarded generally by rail via Kem, though sometimes by water. An advanced Ordnance depot on a small scale was also opened at Medvegia Gora, south of Kem.

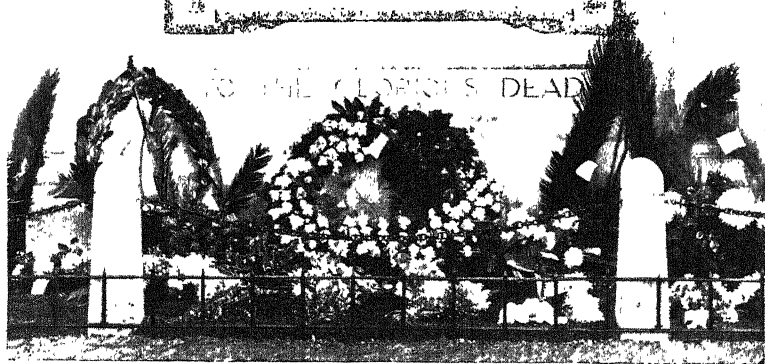
But here also, as on the Dvina, there was failure to make connection with the loyalists whom it had been hoped to join, and the 'White' troops mutinied and turned 'Red.' By August 1919 we had withdrawn our outlying stations to Murmansk and during October our troops sailed for home, taking with them all British arms and ammunition, and leaving behind other stores and clothing in the hope that they might be of some service to such anti-revolutionary Russians as might be prepared to continue the struggle.

* * * * *

So ended these attempts to fight the Russian revolution. The sole material result of all our efforts was to provide the Soviet Republic with what it most lacked—ample resources of first-rate munitions, military equipment of every kind and splendid clothing for its soldiers. The moral effect of the failure was to provide the Bolsheviks with abundant and effective propaganda.



TO THE GLORIOUS DEAD



POSTSCRIPT

ON Armistice Day 1922 there was unveiled at its headquarters a Memorial to those of the Corps who lost their lives in the Great War, over 600 in number. The names inscribed on this Cenotaph are given in an Appendix, while another details the Honours granted to members of the Corps, included among which were 82 direct awards in the field for gallant conduct.

By this time the Army Ordnance Department of officers and the Corps of other ranks had been amalgamated under the title Royal Army Ordnance Corps.

A Colonel-in-Chief had been appointed with a Royal Duke to hold the office, and a Colonel Commandant—a post held in turn by Sir John Steevens, who may be termed the father of the modern Department, by Sir Harold Parsons, equally the father of the modern Corps, and now by Sir Charles Mathew, a distinguished soldier who has seen as much active service probably as anyone in the Army.

Corps Headquarters had moved from Woolwich, a crowded suburb of London, to more spacious premises amid healthier surroundings at Hilsea. There a school of instruction in Ordnance duties had been formed, attended by officers—Regular, Territorial and Dominion—from every part of the Empire. In connection with the Corps Cenotaph a fund was raised for the purpose of training and educating the children of those who died during the Great War. A Corps Association was also formed, affiliated to the British Legion and numbering some two thousand members, to link up past and present members and to help those quitting the army in finding employment.

Had it ever been dreamt that a time would come when we should need to place millions of men under arms, it is possible that the War Office would have hesitated to entrust the supply of munitions, equipment and clothing of such variety and in such immense quantities to one small administrative branch of the army. It might instead

have adopted the plan of continental nations with their great conscript armies where such services are spread among several Corps—artillery, engineers and others—each furnishing its special requirements. I remember Sir Ronald Maxwell, when Quartermaster General in France, telling me in 1916 that he thought the time was then ripe for the Ordnance to shed some of its work, so heavy was its load becoming. Yet, although it had to put forward even greater efforts in the years that followed, it managed to shoulder the burden staunchly throughout.

This goes to prove that concentration of cognate supply services is a sound principle, especially when dealing with technical equipment where elaborately equipped workshops and skilled artisans are needed. Now that warfare is becoming even more scientific and that mechanization is making such rapid strides, this policy is being extended and the Corps has become responsible for the supply of those latest engines of war, Tanks and Dragons, reverting once more to a Master General of Ordnance who is in future to be represented among the Privy Council of a Commander-in-Chief on active service.

Where is this expansion to end? Lately there has been talk of putting the three fighting forces—Army, Navy and Air Force—under the management of one Secretary of State, and the subject crops up periodically when estimates are discussed in Parliament. So far the Cabinet, with its expert advisers, has looked askance at the idea of combining such multifarious duties under one Ministry of War. But if the more civilized nations should succeed in banning warfare as a means of redress among themselves, and in further disarming, it seems not improbable that such a change may come about in time in the interests of economy; for the three services would then form nothing more than an Imperial Police Force.

Any such step would doubtless be followed by a reorganization of Military, Naval and Air Force ancillary services. Probably the supply of kindred types of material would be combined, and it might well happen that the R.A.O.C. would be called upon to furnish all

three fighting services with munitions and other equipment which they use in common.

In that case the wheel would have turned full circle and the Corps would resume the rôle it fulfilled in Tudor or even Mediæval days, when it provided all the Fighting Forces of the Crown with such war-like equipment as had to be drawn from a common and central source.

APPENDIX I

DEAD-WEIGHT TONNAGE SHIPPED TO FRANCE FROM
AUGUST 9TH, 1914, TO NOVEMBER 10TH, 1918

	Tons.
Food, general	3,240,948
Oats and hay	5,438,602
Petrol and sundries	758,614
Coal	3,922,391
Ammunition	5,253,338
Ordnance stores and clothing	1,761,777
Engineering stores (includes sandbags, picks, shovels, barbed wire, etc.)	1,369,894
Railway materials	988,354
Timber	842,759
Road stone	761,540
Mechanical transport	158,482
Tanks	68,167
Royal Air Force stores	123,570
Expeditionary Force Canteen supplies	269,517
Miscellaneous	539,398
Total	<u>25,497,351</u>

APPENDIX II

SCHEDULE OF CORRESPONDENCE, Q.M.G., G.H.Q.

JANUARY 7TH, 1916

From whom received.	Subject.	To whom passed.
2nd Army	Anemometers	D.D.O.S.
do.	9·2 ammunition with No. 44 fuze	D.D.O.S.
1st Army	Shoulder pads	D.D.O.S.
I.G.C.	Commission for Corpl. Ford, A.O.C.	Q. (P)
D.O.S.	Maxim guns	D.D.O.S.
Mil. Secy.	Commission for Mr. D. Williams	Q. (P)
Mil. Secy.	Officers' promotion, Remount Dept.	Q. (P)
D.O.S.	Grading of officers, A.O.D.	Q. (P)
G.S.	"U.S." S.A.A.	D.D.O.S.
G.S.	Travel correction instruments	D.D.O.S.
G.S.	Purchase of automatic rifles by French	D.D.O.S.
G.S.	Lamps electric signalling	D.D.O.S.
A.G.	Gas helmets	D.D.O.S.
A.G.	Ration biscuits	D. of S.
A.G.	Transfer of Lt. Brown, A.S.C.	Q. (P)
C.E.	Helical steel lathing	D.D.O.S.
I.G.C.	Transfer of Lt. Col. Christie, A.S.C.	Q. (P)
I.G.C.	Arming of drafts with short rifles	D.D.O.S.
Mil. Secy.	Appointment of Lt. Murray, A.S.C.	Q. (P)
Mil. Secy.	Major Alleyne, A.S.C.	Q. (P)
Mil. Secy.	Major Brown	Q. (P)
A.G.	Cocoa for men after bathing	D. of S.
3rd Army	18-pr. H.E. amn, with No. 100 fuze	D.D.O.S.
War Office	60-pr. guns	Q.M.G.
do.	Move 2/Lt. Athawes	Q. (P)
do.	Supply of wood	Q.M.G.
do.	do.	Q.M.G.
do.	Stokes Mortars and ammunition	D.D.O.S.
do.	do.	D.D.O.S.
do.	Pay, etc., of men on Railways	D. of Rys.
do.	Ammunition expenditure	Q.M.G.
do.	Move A.A. gun detachment	Q.M.G.
do.	Damage to window at Wokingham	Q.M.G.
M. of M.	Lattey sights	D.D.O.S.
M. of M.	Mills hand grenades	D.D.O.S.
A.G.	Cap badges 19th Canadian Regt.	D.D.O.S.

APPENDIX II

341

From whom received.	Subject.	To whom passed.
G.S. A.G. Mil. Secy.	Moves of Divisions with spare parts Confidential reports Commission, Corpl. Halstead, A.S.C.	D.D.O.S. Q. (P) Q. (P)
DESPATCHED TO WAR OFFICE		
D.D.O.S.	Rounds of Ammunition on L. of C.	War Office
D.D.O.S.	12-inch. howitzer ammunition	do.
Q.M.G.	Transport drivers	do.
Q. (P)	Officers for Labour Corps	do.
D.D.O.S.	Refuzing of ammunition	do.
D.D.O.S.	Foulis trench howitzer	do.
D.D.O.S.	Detonating apparatus	do.
D.D.O.S.	4.5-inch, howitzer ballistite charges	do.
D.D.O.S.	Steel helmets	do.
D.D.O.S.	Weakness of woodwork of rifle	do.
D.D.O.S.	Badges for trench mortar personnel	do.

APPENDIX III

EVENTUAL SUB-DIVISION OF DUTIES IN THE OFFICE OF D.O.S. FRANCE

D.D.O.S. (A) Brig. Genl. Slade Baker

Store Depots and changes of Base.	Camp equipment.	Harness and saddlery.	Accoutrements.
Reorganizations involving alterations of equipment.	Barrack stores.	Wagons.	Anti-gas appliances.
Committees and conferences.	Tools and materials.	Signal and engineering stores.	Body armour.
Transportation and shipping.			Clothing and rag industry.
Salvage and produce.			Gifts.
Demobilization.			Indian equipment.

D.D.O.S. (B) Colonel J. Baker

Artillery equipments.	Ammunition depots.	A.D.O.S. Ammunition.	Lieut. Col. Stokes.
Small arms.	Ammunition supply.		
Estimates of artillery spares.	Ammunition railheads		
Gun Parks.	Ammunition salvage.	Captured stores	Ammunition inspections.
Records of replaced guns.			Technical questions and repairs.
			Construction of ammunition depots and dumps.
			Ammunition packages and empties.

A.D.O.S. (C). Colonel Exham			
Appointments, promotions and commissions of officers, A.O.C.	Posting and moves.	Financial and accountancy matters.	Central registry.
Confidential reports.	Training and instruction.	Financial transactions with Allies.	
Pay, visits and leave.	Reinforcements and labour.	Contracts and bills.	
Order of Battle.	Establishments and records.	Purchases and sales.	
War Diary.	Distribution of personnel.	Losses and deficiencies.	
Honours and rewards.	Promotions, transfers and pay of other ranks.		
	Discipline.		
	P.O.M.E. Colonel Paul		
	C.O.M.E. Lieut. Col. H. J. Jones		
	Gun and carriage designs, ballistics, statistics, experimental workshops, technical reports.		
Drawing Office.	General correspondence.	Vickers equipment specialists.	Specialists in anti-aircraft, height-finding and indicating apparatus.
Moves of workshops.	Wastage of guns and carriages.		
Workshop machinery.	Gun and carriage records.		
Gun spares.	Workshop returns and records.		

APPENDIX IV

NOTES ON THE REFITTING OF A DIVISION WHEN WITHDRAWN FROM THE LINE

DURING the present operations, the question of refitting Divisions withdrawn from the line has required careful attention, and it has come to notice that in certain instances there has been a tendency :—

(a) To order the D.A.D.O.S. to demand from the Base large quantities of equipment and clothing without due consideration as to the need of such action.

(b) In consequence, to accumulate more equipment and clothing than is actually required, and to instruct the D.A.D.O.S. to hold the surpluses so obtained to meet future possible requirements.

The instructions laid down for Ordnance Officers in the Field are to the effect that only such stores or clothing should be demanded as are actually required for use, and that surplus stocks are not to be accumulated. From enquiries made among Divisions who have lately been refitted, these instructions have proved to be satisfactory, and the D.A.D.O.S. from his experience should be the best judge of the quantities that are required.

There are, however, certain points which it is suggested might, with advantage, be impressed upon Divisions :—

1. If information is available, due warning should be given to the D.A.D.O.S. of the Division of :—

- (a) Pending operations.
- (b) The probable withdrawal of the division for refitment.
- (c) The locality in which the refitment will take place.

It is specially important that the place of the refitment should be known, otherwise it is not possible to ensure that stores are sent up to the right destination.

2. **The method of communication between the D.A.D.O.S. and the units of a Division during an action should be definitely laid down so that the D.A.D.O.S. may be aware of the requirements of units from day to day.**

Where it is not desirable for the D.A.D.O.S. to visit his units, it is suggested that Quartermasters should meet him at some fixed point and hour daily; the refilling point would probably be a suitable locality.

Enquiries have shown that demands can still be sent in in the

usual way during an action, and if these demands are supplemented by information obtained by the staff when visiting the front, there should be sufficient information to guide Ordnance Officers in adjusting the size and frequency of the demands sent to the Base.

3. Resources available in the Divisional or Corps Area should be utilized to meet urgent requirements.

For this purpose, clothing and equipment in Divisional laundries can be utilized and replaced at a later date and similar articles brought in to Casualty Clearing Stations and Dressing Stations should be used whenever possible. The various items of equipment salvaged and brought in to salvage dumps should also be made use of. It is understood that these dumps are usually situated near the office of the D.A.D.O.S., and disposal of the stores should be under his direction.

4. All demands should come direct to the D.A.D.O.S. and not to the "Q" staff of Divisions.

This is a matter of importance, otherwise duplication of demands and confusion are sure to arise.

It is the duty of the D.A.D.O.S. to furnish the "Q" staff of the Division with any statistical information they require in connection with demands for guns, machine guns, etc., put out of action, and he should also bring to notice of the "Q" staff any demands which appear excessive. In order that he may be in a position to do this, it is of importance that he should know the reasons which have necessitated such demands.

Demands made without due consideration give rise to surpluses. Instances have also occurred in which stores already handed to the Q.M. of a unit have been reported by the O.C. as not received.

5. Stores should not be accumulated on the lorries of the D.A.D.O.S. as it interferes with his mobility.

In some divisions there appears to be an idea that the lorries allotted to the D.A.D.O.S. should be kept loaded with stores. This impression should be corrected. These lorries are primarily for the conveyance of stores from railhead to the troops, and have proved to be barely sufficient for this purpose.

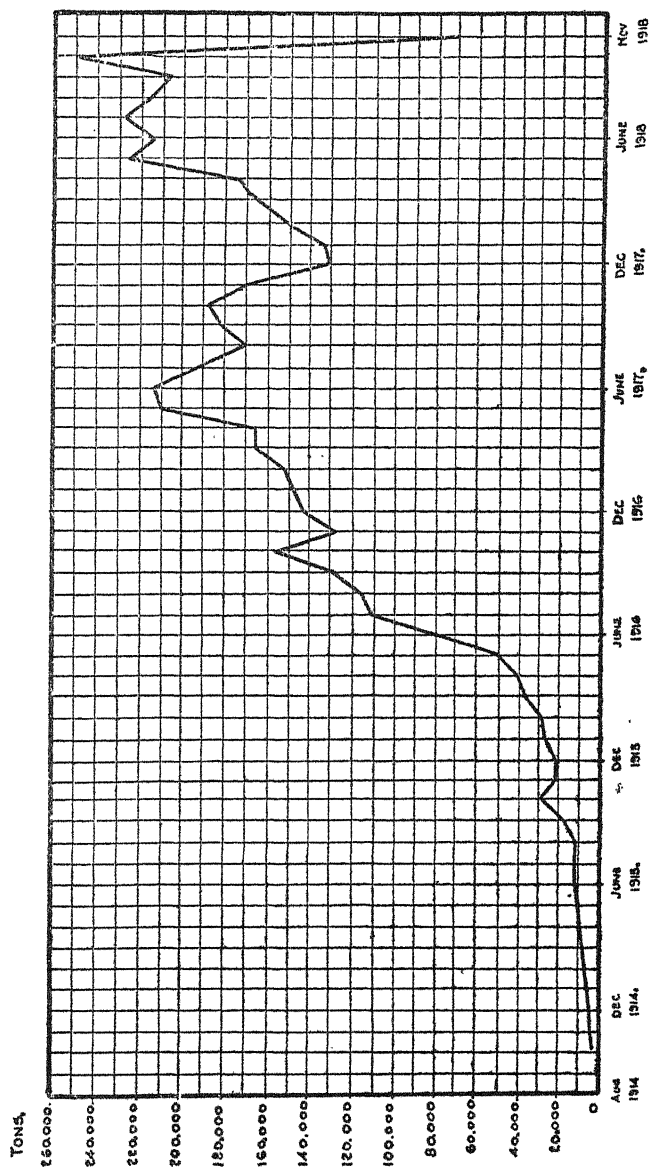
The D.A.D.O.S. has already to be responsible for the reserve of anti-gas appliances, a small quantity of socks and shirts, and for their conveyance from place to place if the Division moves, and these stores alone are sufficient to fully load the four lorries allotted to him.

6. The A.D.O.S. of the Corps should exercise supervision over the whole question of refitment of Divisions in his Corps as he may be able to allocate stores from other Divisional areas in which the Divisions are not refitting.

7. As a result of inquiries which have been made, it is found that if attention is paid to these points the amount of clothing and equipment required from the Base to refit a Division is but small.

G.H.Q., FRANCE.
10.10.16.

APPENDIX V



Monthly Tonnage of Ammunition received in France, Oct. 1914-11th Nov. 1918.
Ordinates represent Total Tonnage landed in each month of the year.

APPENDIX VI

SECRET.

8 A. . 25/9/14.

STATEMENT OF AMMUNITION ON L. OF C.

(The first return compiled during the war.)

APPENDIX VI

Nature of Ordnance.	13-pounder.		18-pounder.		4.5 How.		60-pounder.		6-in. How.		1-inch Pom Pom		Pistol.		S.A.A.	
	No. in Field.		30		324		108		24		16		6		182 machine guns ; 83,500 rifles.	
At railheads																
(Mont Notre Dame and Fère-en-Tardenois)	5,784		12,964		4,750		1,847						137,340		11,103,000	
In transit between Le Mans and railheads	6,000				10,800		2,400		1,440		8,600		16,500		288,000	
At Le Mans (advanced base)	2,072		22,912		4,592											
In transit between Nantes and Le Mans																
At Nantes (base)	1,112		58,308		2,092								564		31,000,000	
Total	14,968		94,184		22,234		4,247		1,440		8,600		154,404		42,391,000	
Rounds per piece	499		290		206		177		90		1,433				14,000 per machine gun plus 477 per rifle	

SECRET.

APPENDIX VI—*cont.*

12 NOON 8/12/17.

STATEMENT OF AMMUNITION ON L. OF C.

(To economize space the first sheet only is given in full. For the other sheets the total figures only are given.)

Nature of Ordnance.	18-pounder.		4.5-in. Howitzer.		60-pounder.		6-in. How. (30-cwt.)		6-in. Howitzer, 26 cwt.	
	2,929		918		444		12		816	
No. in Field.										
	H.E.	Shrap.	H.E.	H.E. 106 Fuze.	H.E.	Shrap.	H.E.	Tubes Friction T.	H.E. with S.A. Blank.	A.P.
G.H.Q. Reserve										
OL Treizennes	3,796	14,092			680	2,430		302		
OF Robecq	27,871	60,592	12,584		1,962	2,288		4,236		
OY Dieval	26,640	65,162								
OD Steenbecque										
OPA Ligny										
OA Flesselles						1,684				
Audruicq	116,176	568,296	203,886	374	(A) 1,707	15,748			164	139
Zeneghem	22,644	179,548	91,818	87,389	(B) 861	7,241		2,009	229	
Dannes	15,316	206,347	175,201	36,190	(C) 10,062	21,692		38,331	25,606	8,053
Boulogne	812		8,731	2,362					907	
Blargies	25,736	216,766	26,500	19,700	(D) 15,500	12,250		29,769	19,846	
Rouxmesnil	406,508	340,970	55,897	16,734	14,343	15,900		51,579	33,743	
Saigneville	115,916	331,744	64,735	3,092	(E) 17,000	15,249		45,840	30,560	994

APPENDIX VI—*contd.*

3-pr.	6-pr.			12-pr.		13-pr.		13-pr. anti-aircraft.		3-inch. gun. 5 cwt.		3-inch 20 cwt.		
	Common.	Case.	Training.	H.E.	Shrap.	H.E.	Shrap.	H.E.	Shrap.	H.E.	Shrap.	H.E.	Shrap.	Incend.
5,190	41,663	3,506	—	2,058	4,092	48,480	57,181	209,646	22,035	1,561	3,187	30,595	13,829	2,000

6-inch gun.										9-inch gun.		9-inch How.		9-inch How. ME. II.		7 1/2-inch gun.	
H.E.		Shrap.		A.P.		6-inch Q.F. Gun.		8-inch How.		8-inch How. Mk. VII.		9-inch How.		H.E.		H.E.	
5 C.R.H.	4 C.R.H.	2 C.R.H.	6 C.R.H.	4 C.R.H.		H.E.	C.P.	H.E.		4 C.R.H.	2 C.R.H.	4 C.R.H.	2 C.R.H.	4 C.R.H.	2 C.R.H.		
Nil.	2,857	70	—	944	177	350	209	212,130	820	82,239	186,674	1,109	6,243				Nil.

9 1/2-inch gun.										9 1/2-inch gun. Mk. VIII.		9 1/2-inch gun Mk. X & XIV.		9 1/2-in. gun Mk. XIII.		12-inch How.		12-inch How. Mk. III & IV.		15-inch How.	
H.E.		Shrap.		A.P.		H.E.		Shrap.		H.E.		H.E.		H.E.		H.E.		Long.		Short.	
4 C.R.H.	2 C.R.H.					4 C.R.H.	2 C.R.H.			4 C.R.H.	2 C.R.H.										
1,086	4	13	110	384	436	1,644	1,961	496	2,200	8,870	3,304	1,966									

APPENDIX VI—*contd.*

12-inch gun.						77 mm. for Portuguese.		AERIAL BOMBS.				
H.E.		Shrap.	C.P.	A.P.	Hollow points.	H.E.	Shrap.	Gas.	112 lb.	Cooper's 20 lb.	Hale's 20 lb.	Incendiary 10 lb.
4 C.R.H.	2 C.R.H.											
1,762	169	176	11	62	23	96,976	6,397	6,848	11,790	5,620	1,965	12,313

SMALL ARM AMMUNITION

Mark VII.	P. type.	Snipers.	Tracer.	Practice.	Machine guns only.
149,028,000	523,623	1,273,639	1,971,486	67,139,000	50,368

CHEMICAL MUNITIONS

13-pr. 9 cwt.		4.5 inch.									
18-pounder.		.									
Inc'dy.	Smoke.	V.N.	J.B.R.	P.F.	S.K.	P.S.	Jellite.	C.B.R.	Smoke.	Thermit.	N.C.
2,567	22,711	18,876	6,854	324	5,209	10,739	142	25,161	4,245	1,045	56,759

CHEMICAL MUNITIONS—*contd.*

60-pounder.							Smoke. candles.
P.F.	S.K.	P.S.	N.C.	C.B.R.	Vincenite.	6-inch How. 30 cwt.	
						P.F.	
200	18,872	17,522	21,023	2,260	21,908	57	
						P.F.	
						243	13,133
							520,352

MORTAR AMMUNITION

2-inch.			3-inch Stokes.		4-inch Stokes.							6-inch.		9 1/4-inch.	
Ordinary.	with silencers.	C.G.	C.G.		C.G.	Ranging.	P.S.	S.K.	Thermit.	Smoke.		N.C.	Newton.	Long.	Ordinary.
										Light.	Heavy.				
82,984	19,444	1,284	554,539	51,159	10,101	117,609	39,246	7,343	19,753	1,909	118,929	2,142	10,419	24,503	

GRENADES

No. 3.	No. 20.	No. 22.	No. 24.	No. 35.	No. 36.	No. 5.	No. 23 Mark II.			No. 27.		No. 28.	P.	K.J.
							Hand.	Rifle.	Rods & Cartridge.	Hand.	Rods & Cartridge.			
12,400	20,980	15,793	70,380	111,820	562,732	15,392	584,716	78,428	207,040	23,457	12,673	4,159	13,603	3,311

APPENDIX VII

(From the *Cologne Post*.)

DISMANTLING SHELLS

A POST-WAR OCCUPATION

THREE hundred and fifty thousand tons of shells! When the War ended such was the amazing quantity of ammunition we had on our hands in France, where it was piled high on 3,500 acres. In a single heap there were 60,000 rounds of 6-in. shells, representing 2,300 tons of steel, about 20 tons of copper, and more than 240 tons of high explosives.

What was to be done with so vast an accumulation of "superfluous" material? Was it to be fired aimlessly into the air or be cast into the sea, there to provide a nine-days' wonder for the fishes? No. The lot was bought for £2,000,000, and ever since the work of converting it into material useful to our manufacturers has gone on steadily.

Every month about 2,000 tons of ammunition, as such, disappears, and in its place there are heaps of metals, chemicals, and so on, the components of such ammunition.

Great is the number of commodities recovered. In addition to steel, iron, brass, copper, lead, aluminium and many alloys, there are resin, numerous chemicals, gases, mechanical parts, rags, felt, cord, etc. Every constituent except one is isolated and returned to this country for utilization in the art of peace.

To obtain these results—in connection with which as many as 10,000 men and women have been engaged at one time—special methods are necessary. An unusual feature of the work is that cranes and other mechanical lifters are not employed. Every shell, after being raised by hand, is transported by means of gravity, and thus the risk of an explosion is minimized as much as possible.

If it is shrapnel, the case is first removed and the propellant extracted. Then, after the fuse and the bush have been taken from it, away it goes to a bench with a V-shaped top and a hopper underneath.

While it is resting here, nose downward, and at an angle of about 45 degrees, hammers play upon the exterior, loosening the contents—shrapnel and resin—which fall on a wire screen over the hopper. The resin rains through the screen, while the shrapnel rolls over it and drops into a box.

Next, the copper band, having been cut through with a cold chisel, is wound off, and finally, the naked, harmless shell is stacked with hundreds of others in readiness for transport to England.

In the case of the high explosive shell, the distinctive operation is removing the bursting charge. This is generally done by "washing out." The shell is inclined at an angle of 40 degrees, with its nose opposite a jet from which hot water and steam are fed into the interior. The steam causes the explosive to break up, dissolve, and flow into suitable receptacles. In from three to thirty minutes, according to the size of the shell, the interior is clear; but, as it is important that it should be quite free from explosive, it is inspected three times before it is finally passed.

German shells are a class by themselves. When the dumps were taken over there were large stocks of projectiles. As little was known about their construction, some research work was necessary before a start could be made in breaking them up. All difficulties, however, have long since been overcome, and German shells are now being used in many ways not contemplated by their makers.

Manifold are the uses of the commodities recovered from ammunition. One of the most interesting, perhaps, is that for the contents of high-explosive shells. From them ammonium nitrate is isolated and evaporated, and the residue, which consists of the extremely dangerous T.N.T. is destroyed. The ammonium nitrate, being a fertilizer, is sold as such, and thus what might have been an element in further devastating the countryside in France is applied to increasing the beauty and richness of our own land.

APPENDIX VIII

QUANTITIES OBTAINED OF A FEW PROMINENT ITEMS OF STORES AND EQUIPMENT PROVIDED BY D.E.O.S.

Description.		Normal average annual con- sumption	Total provided during the war.
Personal equipment—			
Infantry	sets	10,000	6,785,000
Other arms	„	1,000	3,093,000
Anti-gas haversacks		nil.	11,684,000
Water-bottles		45,000	10,037,000
Mess-tins		75,000	16,110,000
Felling and hand axes		330	1,175,000
Pick-axes		1,300	5,470,000
Shovels and spades		2,500	9,466,000
Intrenching implements (carried on the man)		5,000	5,087,000
Harness	single sets	1,000	644,000
Pack-saddlery		35	221,000
Saddlery	sets	1,150	550,000
Waterproof sheets or capes		57,000	13,516,000
Tents		14,700	1,521,000
Hospital bedding	sets	285	536,000
Blankets		148,000	35,690,000
Canvas duck and dowlas	yards	880,000	183,700,000
Mosquito netting	„	nil.	7,797,000
Flannelette for cleaning rifles	„	2,368,000	50,000,000
Horse- and mule-shoes		353,049	62,715,000
Oils	gallons	137,808	29,741,000
Rope and cordage	fathoms	214,970	40,659,000
Boots	pairs	245,000	39,822,333
Shirts		220,000	45,485,205
Socks	pairs	925,000	107,872,068
Jackets		248,000	26,798,933
Trousers		262,000	26,900,656
Cardigans		88,000	18,880,326
Great-coats		57,000	9,263,192
Caps		200,000	23,811,507
Pantaloon		30,000	8,047,210
Leather jerkins and fur undercoats		nil.	4,860,407
Rubber trench boots		nil.	2,608,930

APPENDIX IX

HONOURS AND AWARDS

It is regretted that it has not been found possible to trace the names of all the officers and other ranks of various Regiments who obtained Awards whilst serving with the Ordnance.

OFFICERS

Acton, W. C.	Maj.	O.B.E.
Adams, W. H.	Lt. Col.	O.B.E.
Alaway, H. G.	Capt.	M.C. and bar.
Allen, A. H.	Maj.	Brevet Lt. Col.
Allen, W.E.	Capt.	Granted next higher rate of pay.
Alwood, W. A.	Lt. Col.	O.B.E., Hon. Lt. Col.
Andrews, C.	Capt.	Granted next higher rate of pay.
Andrews, G. H.	Maj.	O.B.E.
Angell, F. G.	Col.	C.B.E., O.B.E.
Anley, H. A.	Col.	C.B.
Appelbe, E. B., C.B.	Col.	C.M.G., Hon. Brig. Gen.
Armstrong, G. M.	Capt.	O.B.E.
Arnett, C. W.	Capt.	M.C.
Arscott, W. H.	Maj.	O.B.E.
Arthur, H. R.	Maj.	O.B.E.
Ashford, O. S.	Capt.	Granted next higher rate of pay.
Atkin, E.	Capt.	Croix de Guerre.
Austin, J. G.	Lt. Col.	C.B., C.M.G., Croix de Guerre, Brevet Col.
Bacon, C. W.	Maj.	O.B.E.
Badcock, H.	Capt.	M.C.
Bailey, J. V. M.	Capt.	M.C.
Bainbridge, N. B., D.S.O.	T/Col.	C.B., C.M.G.
Bainbridge, P. A.	T/Brig. Gen.	C.B., C.M.G., Order of the Nile (3rd Class).
Baker, A. S.	Lt. Col.	C.M.G. Brevet Col. Hon. Brig. Gen.

Baker, J.	Maj.	C.B.E., Brevet Lt. Col.
Banfield, C.	Capt.	M.C.
Banks, H. J. A., D.S.O.	Maj.	Brevet Lt. Col., Medaille d'Honneur Avec Glaives.
Barber, R. F.	Lt. Col.	D.S.O.
Barrett, H. W.	Col.	C.B.
Barton, A. Y.	Col.	C.B.E.
Bashford, R. J. L.	Capt.	O.B.E.
Battersby, T. P.	Hon. Maj.	C.B.
	Gen.	
Beckwith, W. J.	Capt.	O.B.E.
Begbey, H.	Lt. Col.	O.B.E.
Benson, J. J. C.	Capt.	M.B.E.
Bernard, J. F.	Lt. Col.	C.M.G., D.S.O.
Bigg-Wither, H. S.	Capt.	O.B.E., Brevet Maj.
Bilbrough, A. H. B.	Capt.	Brevet Major.
Bishop, W. S. G.	Maj.	D.S.O. Granted next higher rate of pay.
Blackburn, C. C.	Maj.	D.S.O.
Blades, W. W.	Maj.	D.S.O.
Blair, A.	Capt.	M.B.E.
Blake, W. B.	Capt.	M.B.E.
Bloor, F. R.	Capt.	O.B.E., M.C., Order of the White Eagle (4th Class).
Blunt, C. J.	Lt. Col.	C.B.E.
Blunt, H. P.	Maj.	M.B.E.
Body, K. M.	Maj.	C.M.G., O.B.E., Brevet Lt. Col., Ordre de la Couronne.
Body, R. S.	Capt.	M.C.
Bowen, A. S.	Capt.	O.B.E.
Bowen, H. W.	Lt. Col.	C.I.E.
Branson, H. E.	Maj.	O.B.E.
Braybrooke, H. G.	Capt.	O.B.E.
Brewis, J. M.	Capt.	M.C.
Britton, E. J. J.	Maj.	D.S.O., Croix de Chevalier, Lt. Col.
Brown, A.	Lieut.	O.B.E.
Brown, F. A. W.	Capt.	Hon. Major.
Brown, O.	Maj.	D.S.O.
Brown, P. T.	Capt.	M.C.

APPENDIX IX

359

Buckland, F. H.	Capt.	Croix de Guerre, Ordre de Leopold (Chevalier). Granted next higher rate of pay.
Buffham, L. W.	Maj.	O.B.E.
Bush, H. S.	T/Col.	C.B., C.M.G., Brevet Col.
Bush, H. W.	Maj.	Lt. Col.
Butcher, Sir G. T., C.B., C.M.G.	Maj. Gen.	K.C.M.G.
Buxton, C. H.	Capt.	M.B.E.
Bryne, H. F.	Lt. Col.	D.S.O.
Caird, E. D.	Lt. Col.	Brevet Col.
Calder, G.	Capt.	O.B.E.
Campbell, L. E.	Lieut.	Croix de Guerre.
Cannon, G. M.	Lieut.	Croce di Guerra.
Carlyle, T.	Lt. Col.	O.B.E.
Carswell, J. E. I.	Capt.	M.B.E.
Chalkley, F. H.	Maj.	M.B.E.
Chandler, A. F. N.	Maj.	O.B.E.
Chandler, C. J. G.	Capt.	O.B.E.
Chaplin, H. S.	Maj.	O.B.E.
Chapple, J. G.	Capt.	M.C.
Chester, S. C. R.	Maj.	M.B.E.
Clark, R. L., D.S.O.	Lt. Col.	O.B.E., Order of the White Eagle (4th Class with swords).
Clarke, J. B.	Lieut.	M.B.E.
Clifford, B.	Capt.	M.C.
Cloudsley, J. L.	Lieut.	Croix de Guerre.
Cockburn, W. G.	Maj.	O.B.E.
Collacott, J. R.	Lt. Col.	D.S.O.
Collison, E. O.	Lieut.	M.C.
Colquhoun, A. H.	Capt.	O.B.E.
Connan, J. C.	Capt.	O.B.E.
Cooper, A. E.	Capt.	M.B.E.
Cooper, H.	Major	O.B.E.
Corbett, R. L.	Lt. Col.	C.B.E.
Corbett-Sullivan, E. P.	Lieut.	M.C.
Corder, A. A.	Maj.	C.M.G., O.B.E.
Courtice, J. G.	Maj.	D.S.O., Brevet Lt. Col.

Coyle, J. W.	Capt.	M.C.
Craighead, R. F.	Lieut.	M.C.
Craik, T.	Maj.	O.B.E.
Crawford, R.	Col.	C.B.
Cunningham, R. A.	Maj.	D.S.O.
Dailley, W. G. B.	Maj.	O.B.E.
Danson, T.	Maj.	M.B.E.
Davidson, E.	Lt. Col.	C.M.G., Brevet Lt. Col.
Davies, J.	Capt.	O.B.E.
Davies, P. G.	Maj.	C.M.G., Hon. Lt. Col.
Davies, W. T.	Lt. Col.	Brevet Col.
Deane, C. H.	Lieut.	M.C.
Denison, P. B.	Capt.	M.C.
de Smidt, E. M.	Maj.	C.M.G.
Dickson, A. L.	Capt.	M.C.
Dickson, W.	Lieut.	Capt. O.B.E.
Dixon, W. C.	Lt. Col.	C.B.E., D.S.O.
Dodds, A. F.	Lieut.	O.B.E.
Dodds, J.	Maj.	O.B.E.
Dodds, T. E.	Capt.	M.B.E., Croce di Guerra.
Dolphin, H. C.	Major	D.S.O.
Donovan, T.	Maj.	O.B.E.
de Wolff, C. E.	T/Lt. Col.	C.B.E., Russian Order of Vladimir (4th Class).
Dooner, W. D.	Maj.	C.M.G., O.B.E. Brevet Lt. Col.
Dorrington, F. J.	Lieut.	M.B.E.
Douglas, C. R.	Capt.	M.C.
Douglas, J. R.	Lieut.	M.C.
Douglas-White, C. F.	Capt.	M.B.E.
Dudley, G. de S.	Maj.	C.M.G., Brevet Lt. Col. Order of the Crown of Italy, Commander
Duguid, D. R.	Lieut.	M.B.E., Order of St. Stanislas (3rd Class).
Dunsterville, K. S.	Col.	C.B.E.
Dymock, A.	Maj.	O.B.E.
Eagles, A. C. H.	Capt.	M.C.
Earp, J. P.	Capt.	M.C.
Earp, T. J. L.	Maj.	O.B.E.

APPENDIX IX

361

Eastwood, H. E.	Capt.	M.C., Legion d'Honneur, Croix de Chevalier.
Echlin, G. F. W.	Maj.	O.B.E.
Egan, M. H.	Colonel	C.M.G., C.B.E.
Eley, R.	Lieut.	Granted next higher rate of pay.
Elliott, H. F.	Capt.	M.C.
Ensor, F. C. C.	Maj.	O.B.E.
Erby, H. W.	Maj.	O.B.E.
Erwin, H.	Maj.	O.B.E.
Evans, W. J.	Lieut.	M.B.E.
Everest, W. C. R.	Maj.	O.B.E.
Everett, C. W.	Lt. Col.	C.M.G., Lt. Col.
Exham, F. S.	Maj.	D.S.O., Bt. Lt. Col.
Faichnie, D. C.	Col.	C.M.G.
Farquharson-Roberts, K. F.	Maj.	O.B.E.
Fasson, T. W.	Maj.	O.B.E., Major.
Fawcett, E. G. D.	Capt.	O.B.E.
Fernyhough, H. C., D.S.O.	Lt. Col.	Bt. Lt. Col., C.M.G., Croix de Guerre, Ordre de Leopold (Officier) Brevet Col.
Field, W. S.	Lieut.	M.B.E.
Finch, G. I.	Lieut.	M.B.E.
Findlay, R. J.	Lt. Col.	O.B.E., Major, Legion d'Honneur, Croix de Chevalier, Lt. Col.
Finnis, F. A.	Maj.	Brevet Lt. Col.
Fisher, C. A.	Col.	D.S.O.
Fisher, C. T.	Lt. Col.	O.B.E., Brevet Lt. Col.
Fisher, A. J.	Maj.	Brevet Lt. Col.
Fisher, R. M.	Lieut.	M.C.
Fleischl, W.	Maj.	O.B.E.
Fletcher, A. B. W.	Lieut.	M.C.
Forbes, A.	T/Maj. Gen.	C.B., C.M.G.
Forsdick, E. T.	Maj.	O.B.E.
Forster, F. G. O.	Capt.	M.C.
Fuller, C. W.	Maj.	Lt. Col.
Gadsby, P.	Capt.	O.B.E.
Gale, F. R.	Lieut.	M.B.E.

Gardner, F. W.	Capt.	D.C.M., O.B.E.
Garstin, H. E.	Lt. Col	D.S.O., Croce di Guerra, Brevet Col.
Gay, G. J.	Capt.	M.C.
Gee, H. J.	Capt.	Brevet Maj., M.C. and two bars, Croix de Guerre.
Gibbs, P. J.	Maj.	O.B.E.
Gibson, A. C. V.	Maj.	O.B.E., Croix de Chevalier.
Gordon-Forbes, B. F. A.	Maj.	O.B.E.
Graves, B.	Capt.	Military Order of Avis (Chevalier).
Gray, A.	Capt.	M.C.
Green, W. R.	Maj.	O.B.E.
Gregson, H. G. F. S.	Lt. Col.	C.M.G.
Greig, K. C.	Maj.	O.B.E.
Grieve, J. H.	Capt.	M.C.
Grute, J.	Maj.	D.S.O.
Haigh, C. F. T.	Capt.	M.C. and bar.
Hale, T. W.	Col.	C.B., C.M.G., C.B.E., Croce de Guerra.
Hamilton, D.	Capt.	M.C.
Hamilton, R. S.	Lt. Col.	D.S.O., C.M.G.
Hamlin, R. J.	Lt. Col.	O.B.E.
Harbinson, W. D.	Lt. Col.	O.B.E.
Harding, A. G.	Capt.	O.B.E.
Hare, R. G. P.	Maj.	O.B.E.
Harley, E. W. J.	Capt.	M.B.E.
Harries, B. G. G.	Capt.	M.C.
Harrison, J. L.	Lieut.	M.B.E.
Harwood, G. (Mrs.)		M.B.E.
Haslam, E. H.	Lieut.	M.C.
Havercroft, J. W.	Lieut.	Medaille d'Honneur Avec Glaives.
Hawkes, C.	Lieut.	M.B.E., M.C.
Hay, G. L.	Col.	C.B.E., D.S.O., Brevet Lt.-Col.
Hayley, S. T.	Maj.	D.S.O., O.B.E., Chevalier, Order of the Crown of Italy.
Heath, E.	Col.	C.M.G.
Henderson, E.	Maj.	Brevet Lt.-Col.

APPENDIX IX

363

Heron, Sir T.	Hon.	C.B., K.B.E., C.B.E., Brig. Gen.	Hon. Brig. Gen.
Hibbert, J. G.	Capt.	M.C.	
Hicks, J. M.	Maj.	M.B.E., Maj.	
Higgs, W.	Capt.	Granted next higher rate of pay.	
Hill, B. A.	Maj.	D.S.O., Brevet Lt. Col.	
Hill, D. J. J.	T/Col.	C.M.G., D.S.O.	
Hill, F. W. R., D.S.O.	Bt. Lt. Col.	Bt. Lt. Col., C.M.G., O.B.E.	
Hinks, E.	Capt.	M.B.E.	
Hoare, L. L.	Maj.	D.S.O.	
Holland, R. M.	Maj.	O.B.E.	
Hopkins, G. R.	Bt. Maj.	O.B.E., Brevet Maj.	
Howard, W.	Capt.	O.B.E.	
Howell-Jones, J. H.	Brevet Lt. Col.	Brevet Maj., C.I.E., D.S.O., Brevet Lt. Col.	
Hughes-Jones, J. T.	Maj.	O.B.E.	
Irons, T. W.	Capt.	M.B.E.	
Jack, D. J.	Capt.	M.C.	
Jackson, Sir R. W. M., C.B., C.M.G.	Brig. Gen.	K.C.M.G., K.B.E., Order of the White Eagle (3rd Class with swords).	
James, D. M.	Lieut.	Greek Medal for Military Merit (3rd Class).	
James, E. L. H.	Lt. Col.	O.B.E., Brevet Lt. Col.	
Janson, F. E.	Capt.	M.B.E.	
Jarmain, H. W.	Capt.	Granted next higher rate of pay.	
Jeans, C. G.	Hon. Maj. Gen.	C.B.	
Joel, H. C.	Capt.	O.B.E.	
Johns, F.	Capt.	M.B.E.	
Johnson, G. E. A.	Lieut.	D.S.O.	
Johnson, H. B.	Capt.	O.B.E., M.C.	
Johnson, H. C. J.	Maj.	O.B.E.	
Johnson, R. C.	Capt.	M.C.	
Jones, C. R.	Lt. Col.	D.S.O., Brevet Lt. Col.	
Jones, E. S.	Capt.	M.C.	

Jones, H. J.	Maj.	O.B.E.
Jones, J.	Capt.	O.B.E.
Jones, W.	Capt.	O.B.E.
Kearn, A. W.	Capt.	O.B.E., Order of St. Stanislas with swords (2nd Class).
Keddie, H. W. G.	Col.	C.B.E., D.S.O.
Keith, G.	Capt.	O.B.E.
Kempson, G. C. D.	Maj.	D.S.O.
Kennedy, J.	Maj.	Lt. Col.
Kerr, R.	Lieut.	M.B.E.
Kerrison, E. A.	Capt.	Granted next higher rate of pay.
Keyes, J. H.	Lieut.	M.C., Major.
Kirkby, H. McK.	Capt.	M.C., D.C.M.
Kirkham, J.	Capt.	O.B.E.
Kirkland, J.	Capt.	O.B.E.
Kitchen, W. T.	Capt.	Granted next higher rate of pay.
Knaggs, M. H.	Lt. Col.	C.M.G., Brevet Col.
Knibbs, K. M.	Capt.	Maj.
Lancaster, R. J.	Capt.	Granted next higher rate of pay.
Langhorne, H. S.	T/Brig. Gen.	C.B., C.M.G.
Larmour, F. C.	Maj.	D.S.O.
Lash, I. R. de W.	Maj.	O.B.E.
Last, A. J.	Lt. Col.	D.S.O., Lt. Col.
Law, R. T. H.	Brig. Gen.	C.B.
Lawrence, A.	Capt.	O.B.E.
Leahy, T. B. A.	Lt. Col.	C.M.G., D.S.O.
Leamy, A.	Maj.	O.B.E.
Leane, E. T.	Col.	C.B.E.
Lees, G.	Maj.	O.B.E.
Leggett, E. J.	Maj.	O.B.E.
Leslie, S. G.	Maj.	O.B.E.
Lethaby, T.	Maj.	O.B.E., Major, Order of the White Eagle (4th Class) Cavalier Order of St. Maurice & St. Lazarus.
Lewis, F. W.	Lieut.	M.C.

APPENDIX IX

365

Lewis, L. C.	Maj.	O.B.E.
Litchfield, J. W.	Capt.	M.B.E.
Link, W. C.	Maj.	O.B.E.
Linsell, W.	Maj.	Granted next higher rate of pay.
Littlejohns A. E.	Capt.	M.B.E.
Lovett, H.	Maj.	Lt. Col.
Low, C. F. G.	Major	O.B.E.
Lynam, J. M.	Lieut.	M.C.
MacDonald, E. W. C.	Lieut.	M.B.E.
Macpherson, E. R.	Lt. Col.	O.B.E.
Mackenzie, C. A.	Capt.	M.C.
Mackenzie, W. S.	Lt. Col.	D.S.O., O.B.E.
Malcolm, W. A.	Maj.	Brevet Maj., O.B.E.
Man, H. W.	Brevet Lt. Col.	Brevet Lt. Col., C.B.E., D.S.O., Croix de Guerre.
Manuelle, G. M.	Capt.	M.C.
Marfleet, E. C.	Capt.	M.C.
Markwick, E. E.	Col.	C.B.E.
Marshall, H. A.	Maj.	D.S.O.
Mason, H. G.	Capt.	O.B.E.
Mathew, Sir C. M., C.B., D.S.O.	Maj. Gen.	K.C.M.G., Order of the White Eagle (3rd Class with swords). Promoted Maj. Gen.
May, N. B.	Maj.	O.B.E.
McCheane, M. W. H.	Lt. Col.	C.M.G., C.B.E., Order of the White Eagle (3rd Class with swords).
McDonald, A. E.	Capt.	Granted next higher rate of pay.
McDonald, J.	Capt.	M.B.E.
McGown, J.	Capt.	M.C.
McLeod, L. F.	Maj.	O.B.E.
McNab, R. C.	Maj.	O.B.E.
McPherson, D. C.	Capt.	M.B.E.
McVittie, R. H.	Col.	Brevet Lt. Col., C.B.E., Brevet Col., C.M.G.
Meadows, H. G.	Capt.	M.B.E.
Meager, J. G.	Capt.	Granted next higher rate of pay.

Meares, M.	Maj.	C.M.G., D.S.O., Croix de Chevalier.
Medcalfe, J. C.	Capt.	O.B.E.
Mephram, C. E.	Capt.	O.B.E.
Miller, F.	Capt.	Granted next higher rate of pay.
Miller, J. C.	Lieut.	O.B.E., Greek Medal for Military Merit (3rd Class).
Mills, J. J.	Lt. Col.	O.B.E.
Moore-Lane, W.	Col.	C.B.E.
Morison, Sir W. T., K.C.S.I.	Maj.	C.M.G.
Morris, F.	Maj.	O.B.E., M.C.
Morrison, J. F.	Capt.	O.B.E.
Mortimer, F. G. C.	Capt.	O.B.E.
Moulton-Barrett, E. A., C.M.G.	Col.	Hon. Brig. Gen., C.B., Legion d'Honneur, Croix d'Officier.
Murphy, J.	Capt.	Major.
Murray, F. M.	Maj.	Brevet Lt. Col.
Murray, J. A. S.	Lt. Col.	D.S.O.
Neale, M. R.	Capt.	M.C.
Needham-Smith, S.	Lieut.	M.C.
Newman, E.	Capt.	Chevalier Order of of the Crown of Italy.
Newton, L. C.	Capt.	Croix de Guerre, Croce di Guerra.
Nicholls, G. B. T.	Maj.	O.B.E.
Nowlan, T. B.	Lt. Col.	Brevet Col.
Oddboy, J. C.	Capt.	Granted next higher rate of pay.
Oldfield, A. R.	Lt. Col.	D.S.O., Brevet Lt. Col.
Oldfield, C. G.	Lt. Col.	C.M.G., C.B.E.
Oldham, A. J.	Capt.	Military Order of Avis (Chevalier).
Oliver, E. V.	Capt.	O.B.E.
Oliver, W. J.	Lt. Col.	C.B.E.
Omond, J. S.	Capt.	M.C., Military Order of Avis (3rd Class).
O'Neill, T. T.	Capt.	Granted next higher rate of pay.
Oxenham, E. J.	Capt.	M.C.

APPENDIX IX

367

Packford, C. W.	Capt.	O.B.E.
Palmer, E. H.	Capt.	O.B.E.
Palmer, H. J. L.	Lt. Col.	O.B.E.
Parker, P. F.	Maj.	M.B.E.
Parkinson, P. G.	Lt. Col.	O.B.E.
Parsons, Sir H. D. E., C.M.G.	Maj. Gen.	Hon. Maj. Gen., C.B., Croix de Guerre, Ordre de Leopold (Commandeur), Order of St. Stanis- las (2nd Class with swords), K.C.M.G.
Paul, D.	Lt. Col.	C.B., C.M.G., C.B.E.
Payne, G.	Capt.	O.B.E.
Penn, B. H.	Maj.	D.S.O.
Penn, H. A.	Maj.	O.B.E., Order of St. Stanislas (2nd Class with swords), Order St. Anne (3rd Class).
Perceval, F. W.	Capt.	O.B.E., Brevet Maj.
Perry, Sir H. W.	Brig. Gen.	C.B., K.C.M.G., C.S.I. Legion d'Honneur— Croix d'Officier.
Pirie, H. L.	Capt.	M.C.
Playfair, G. R.	Capt.	M.C.
Potter, F. T.	Maj.	O.B.E., M.C.
Poulton, F. C.	Capt.	O.B.E.
Pring, J. N.	Lieut.	M.B.E.
Pugh, G. W.	Capt.	O.B.E., Greek Medal for Military Merit (3rd Class).
Pym, F. H. N.	Lt. Col.	C.M.G., O.B.E.
Ratcliffe, E. W. B.	Capt.	M.C.
Reed, J. P.	Lieut.	M.C.
Reed, B. N.	Capt.	M.B.E.
Rees, H.	Maj.	O.B.E., Lt. Col.
Reid, J.	Capt.	M.B.E.
Rennick, D.	Maj.	M.B.E.
Richards, P. S.	Lieut.	M.B.E.
Richards, W. W.	Maj.	M.C.
Robertson, C. J. T.	Lt. Col.	O.B.E., M.C., Order of St. Stanislas (2nd Class with swords).

Robertson, T. A.	Maj.	O.B.E., Lt. Col.
Robinson, E. H.	Maj.	D.S.O.
Rodd, J. M.	Capt.	M.C.
Rodd, W. J. P.	Maj.	D.S.O.
Rodliffe, T.	Maj.	O.B.E.
Rogers, L. C.	Lieut.	O.B.E.
Roth, A. A.	Maj.	O.B.E.
Rowbotham, F.	Capt.	O.B.E.
Rudd, H.	Lt. Col.	Lt. Col., O.B.E.
Russell, R. T.	Maj.	Brevet Lt. Col., C.M.G.
Samut, A., C.M.G.	Lt. Col.	C.B.
Sanderson, J. G.	Lieut.	M.C.
Saunders, C. H.	Maj.	C.M.G.
Scott, C. R.	Lieut.	Ordre de l'Etoile Noire—Officers.
Scott, R. K., D.S.O.	Hon. Brig. Gen.	C.B., C.M.G., Com- mandeur Ordre de Leopold, Hon. Brig. Gen.
Severn, H.	Capt.	Greek Medal for Military Merit (3rd Class).
Seymour, Sir E. H.	T/Brig. Gen.	C.B., C.M.G., K.B.E., Order of the White Eagle (3rd Class).
Shead, A. T.	Capt.	M.C.
Sheppard, R. O.	Lt. Col.	D.S.O.
Sheppard, W. T.	Lt. Col.	D.S.O.
Sheriff, G.	Capt.	M.C.
Sherwood, O. C.	Brevet Lt. Col.	D.S.O.
Shoetensack, E. L.	Maj.	O.B.E., Croce di Guerra.
Sidney, E. H.	Capt.	O.B.E., Granted next higher rate of pay.
Sigrist, E.	Capt.	O.B.E.
Slaughter, E. W.	Capt.	M.B.E.
Smith, C.	Lieut.	Capt.
Smith, D. R.	Capt.	O.B.E., M.C.
Smith, J.	Capt.	M.B.E.
Smith, W. H. U., D.S.O.	T/Brig. Gen.	C.B., C.B.E., Order of the Redeemer (3rd Class).

APPENDIX IX

369

Smith, W. W.	Capt.	O.B.E.
Smyth, H. E.	Maj.	D.S.O., O.B.E.
Snelling, L. F.	Maj.	O.B.E.
Sommerville, W. H. L.	Lieut.	M.C.
Sparey, P. W. M.	Capt.	M.C., Granted next higher rate of pay.
Spears, G. W.	Lieut.	M.C.
Spencer, M.	Lt. Col.	C.M.G., Order of the White Eagle (3rd Class with swords). Greek Medal for Military Merit (3rd Class).
Spinks, E. G.	Capt.	M.B.E.
Spranger, F. J.	Maj.	O.B.E.
Stamford, A. R.	Capt.	D.S.O.
Steevens, Sir J., K.C.B.	Maj. Gen.	K.C.M.G., Cavalier Ordre St. Maurice & St. Lazarus, Order of Crown of Italy (Commander).
Stephen, C. M.	Lt. Col.	Brevet Lt. Col., C.M.G.
Stephenson-Jellie, J. P.	Capt.	M.C.
Stevenson, R.	Capt.	M.C., O.B.E.
Stewart, A. G. B.	Capt.	O.B.E.
Stokes, W. N.	Maj.	O.B.E., D.S.C.
Stone, J. H.	Lt. Col.	D.S.O.
Stower, L. A. W.	Capt.	M.C.
Stuart, M. R. F. H.	Capt.	Croce di Guerra.
Sudds, W. B.	Lt. Col.	C.B.E.
Suggate, C. F. D.	Capt.	M.C.
Swallow, W. H.	Maj.	O.B.E.
Swanzy, F. H.	Capt.	O.B.E.
Symons, J.	Maj.	C.B.E., Order of St. Anne (2nd Class).
Tailby, M.	Lieut.	M.B.E.
Taylor, R. H. B.	Col.	C.B., Hon. Brig. Gen.
Thornton, B. M.	Capt.	M.C.
Thorp, J. C.	Lt. Col.	D.S.O., O.B.E.
Tosswill, F. S.	Capt.	O.B.E.
Townsend, W. H.	Capt.	Maj.
Tracy, W. M.	Lt. Col.	O.B.E.
Travers, H. C.	Col.	C.B.E., D.S.O., Brevet Lt. Col.

Trevor, P. C. W.	T/Col.	C.B.E.
Tribe, J. C.	Maj.	O.B.E.
Trimnell, W. D. C.	Col.	C.B., C.M.G., Legion d'Honneur, Croix d'Officier, Ordre de Leopold (Officier), Croix de Guerre, Military Order of Avis (2nd Class).
Truscott, J. J.	Lt. Col.	Order of Star of Rou- mania, Cavalier Order of St. Maurice & St. Lazarus, Croce di Guerra, Lt. Col.
Tucker, C. E.	Capt.	O.B.E.
Tufnell, L. C. G.	Col.	C.B., Hon. Brig. Gen.
Turner, J. G.	Lieut.	M.B.E., D.C.M., Order of St. Stanis- las (2nd Class).
Turney, F.	Capt.	O.B.E., Military Order of Avis (Commander).
Twidale, W. C. E.	Maj.	C.M.G., D.S.O., Brevet Lt. Col.
Tyrrell, R. B.	Maj.	O.B.E.
Urquhart, C. E.	Lieut.	M.B.E.
Urquhart, V. W.	Capt.	M.C.
Valon, A. R.	Capt.	O.B.E., M.C.
Vernall, J. H.	Capt.	M.C.
Verschoyle-Campbell, W. H. McN.	Maj.	O.B.E., M.C., Brevet Maj.
Vinycomb, T. B.	Lieut.	M.C.
Vinicombe, R. E. B.	Capt.	Order of St. Anne with swords (2nd Class).
Walker, O. A.	Maj.	Croix de Guerre.
Walker, W.	Maj.	M.B.E.
Wallace, J. H.	Capt.	Granted next higher rate of pay.
Warde, F.	Capt.	O.B.E.
Warwick, H. B.	Maj.	D.S.O., Brevet Lt. Col.

APPENDIX IX

371

Watkins, C. T.	Capt.	M.C.
Watling, S.	Capt.	M.C.
Watson, J.	Capt.	O.B.E.
Watts, C. D. R.	T/Col.	C.B., C.M.G., Croix de Guerre, Ordre de Leopold (Officier), Brevet Col.
Watts, R. G.	Capt.	Order of St. Stanislas (3rd Class with swords).
Webb, P.	Maj.	O.B.E.
Webster, F. C.	Maj.	O.B.E.
Webster, G. F. A.	Capt.	O.B.E.
Wethered, H. L.	Lt. Col.	C.M.G., D.S.O.
Whitaker, H. C.	Capt.	Brevet Maj.
Whitaker, J. W.	Capt.	M.C., Ordre du Merite Agricole.
White, B. C.	Lt. Col.	O.B.E.
Whitfield, R. L.	Maj.	O.B.E.
Witney, J. H.	Capt.	M.B.E.
Whitteridge, P. C.	Lieut.	M.B.E.
Wicks, F. J.	Capt.	M.C.
Wiggins, C.	Maj.	O.B.E.
Wilkins, R.	Capt.	O.B.E.
Williams, A. H.	Maj.	O.B.E.
Williams, F. C.	Capt.	M.C.
Williams, L. H.	Capt.	M.C.
Williams, S.	Capt.	Order of the White Eagle (5th Class).
Wilson, C. M.	Lieut.	M.C.
Willson, H. S.	Maj.	O.B.E., Order of the Nile (4th Class).
Winch, S. B.	Capt.	O.B.E.
Wood, J. H.	Capt.	O.B.E.
Woodifield, A. H.	Lt. Col.	C.B., O.B.E., C.M.G.
Worssam, C. A.	Maj.	O.B.E.
Woosley, E. H.	Capt.	M.B.E.
Wort, W. E.	Capt.	O.B.E.
Wortham, P. W. T. H.	Brevet Lt. Col.	C.B., Brevet Lt. Col., Brevet Col.
Wright, A. J.	Capt.	O.B.E.
Wright, C.	Capt.	O.B.E.
Wright, F. T.	Lieut.	M.B.E.
Wrigley, C. C.	Colonel	C.B., Hon. Brig. Gen.

APPENDIX IX

OTHER RANKS

Accleton, H.	S. Cdr.	M.S.M.
Ackers, J. C.	S. Cdr.	M.S.M.
Adams, F. S.	Sgt.	M.S.M.
Ahl, W. H.	Ar. S. Sgt.	M.S.M.
Airlie, E.	Pte.	M.S.M.
Albon, A. G.	L. Cpl.	M.M.
Alexander, E. V.	At. Q.M.S.	D.C.M.
Allen, J. A.	Cdr.	M.S.M.
Allen, J. L.	S. Sgt.	M.S.M.
Allen, R. S.	S. Cdr.	M.S.M.
Alleway, H. J.	S.Q.M.S.	M.S.M.
Anderson, J.	S. Cdr.	M.S.M.
Anderson, R. P.	At. S.M.	M.S.M.
Andrews, H. C.	Cdr.	M.S.M. Medaille d'Honneur Avec Glaives (en Argent).
Andrews, J.	S. Cdr.	M.S.M.
Anthony, J.	Ar. Q.M.S.	M.S.M.
Appleton, G. A.	S. Sgt.	M.S.M.
Archer, J. W.	Cpl.	M.M.
Armstrong, A. L.	At. S.M.	M.S.M.
Arnold, J. J. C.	Ar. S. Sgt.	M.S.M.
Arnold, W. C.	Sgt.	M.M.
Arscott, F.	S. Cdr.	M.S.M.
Asbery, C.	S. Sgt.	M.S.M.
Atkins, C.	Pte.	M.S.M.
Atkinson, A. H.	S. Cdr.	M.S.M.
Aylett, W. F.	S. Cdr.	M.S.M.
Baker, W.	S. Cdr.	M.S.M.
Bakewell, G. J.	S. Sgt.	M.S.M.
Bakewell, W.	At. Q.M.S.	M.S.M.
Bancroft, A. C.	S. Cdr.	M.M.
Bancroft, G. F.	Cdr.	M.S.M.
Barber, E.	Sgt.	M.S.M.
Bardgett, J. W.	Sgt.	Portuguese Military Medal for good service
Barnes, L. J.	At. S.M.	M.S.M.
Baron, R. W.	Sgt.	M.S.M.
Bartlett, J.	S. Q.M.S.	M.S.M.

APPENDIX IX

373

Batchford, F.	S. Q.M.S.	M.S.M.
Bates, G. P.	S. Cdr.	M.S.M.
Bateman, B.	S. Cdr.	M.S.M.
Battle, F. J.	At. S.M.	M.S.M.
Bawden, C. A.	S. Cdr.	M.S.M.
Baxter, A. T. W.	Pte.	M.M.
Beale, C. M.	S. Cdr.	M.S.M.
Beckett, H. S. J.	S. Cdr.	D.C.M.
Beckley, A. A.	S. Cdr.	M.S.M., Ordre de Leopold II (Chevalier).
Beecham, F. C.	S. Cdr.	M.M.
Beedle, W. T.	Sgt.	M.S.M.
Beere, F. W. H.	S. Cdr.	M.S.M.
Belben, L. H.	S. Q.M.S.	M.S.M.
Bell, J.	Ar. Q.M.S.	M.S.M.
Benwell, F. F.	Ar. S. Sgt.	M.S.M.
Berg, L.	S. Cdr.	M.S.M.
Best, P.	At. Q.M.S.	M.S.M.
Birch, A.	Cpl.	M.S.M.
Bird, E. F.	At. Q.M.S.	M.M.
Blackman, A. H.	At. S.M.	Medaille d'Honneur avec Glaives (en Vermeil).
Blease, W.	Corpl.	M.S.M.
Blewitt, H.	Cdr.	M.S.M.
Board, E. F.	At. S. Sgt.	M.S.M.
Bodle, G. F.	S. Cdr.	M.S.M.
Bodsworth, E. G.	At. S. Sgt.	M.M.
Bolt, G. H.	Pte.	M.M.
Bonaker, W. H.	At. Q.M.S.	D.C.M.
Boniface, J. H.	At. S.M.	M.S.M.
Borley, G. W.	S. Cdr.	M.S.M.
Borer, E. G.	Cdr.	M.S.M.
Bougourrd, W. R.	S. Cdr.	M.B.E., M.S.M., Medaille d'Honneur avec Glaives (en Argent).
Bowden, E.	S. Sgt.	M.S.M.
Bowes, F. W.	At. S. Sgt.	D.C.M.
Bowie, J.	Sgt.	M.S.M.
Bowyer, C. W.	Cdr.	M.S.M.
Bradford, A. H.	Pte.	M.M., M.S.M.
Bradford, H. J.	Pte.	M.S.M.
Bradley, A.	Pte.	M.S.M.

APPENDIX IX

Bradley, S. C.	Ar. Q.M.S.	M.S.M.
Brand, D. W.	At. S. Sgt.	Croix de Guerre (Belgium).
Brand, S.	S. Cdr.	M.S.M.
Brander, W.	Pte.	M.M.
Breed, A. F.	S. Cdr.	M.S.M.
Brennen, V. T.	Cdr.	M.S.M.
Brennen, W. A.	Cdr.	M.S.M.
Brewster, W. T.	S. Cdr.	M.B.E., M.S.M.
Briggs, A.	At. S. Sgt.	D.C.M.
Bright, L. J.	Ar. S. Sgt.	M.S.M.
Brodie, D.	S. Q.M.S.	M.S.M.
Brookes, A. J.	Cpl.	M.S.M.
Brooks, G. H.	S. Cdr.	M.S.M.
Broughton, J. D.	S. Cdr.	M.S.M.
Brown, C. J. A.	S. Cdr.	M.S.M.
Brown, F. C.	Ar. S. Sgt.	M.S.M.
Brown, H.	S. Sgt.	M.S.M.
Brown, H.	S. Sgt.	M.S.M.
Brown, S. W.	At. S.M.	M.C.
Brown, W.	S. Sgt.	M.S.M.
Brown, W. E.	At. S. Sgt.	M.S.M.
Brownhill, R. F.	At. S.M.	M.S.M.
Bruce, A.	Ar. Q.M.S.	M.S.M.
Bryant, A. E.	At. Q.M.S.	M.S.M., Croix de Guerre.
Bryant, G.	Cdr.	M.S.M.
Bryant, J. E.	At. S. Sgt.	Portuguese Military Medal for Good Service.
Bryant, T.	Cdr.	M.S.M.
Bryne, P. A.	S. Cdr.	M.S.M.
Buckett, E. S.	S. Cdr.	M.S.M.
Buffee, E. W.	Cdr.	M.S.M.
Bull, W.	At. S.M.	M.B.E.
Burbury, W. H.	Ar. S. Sgt.	M.S.M.
Burdon, W.	At. S.M.	M.S.M.
Burgin, A.	S. Cdr.	M.S.M.
Burrell, H. E.	S. Cdr.	M.S.M.
Burrows, R.	S. Cdr.	M.S.M.
Burton, E.	At. S.M.	M.S.M.
Burton, R.	Sgt.	M.S.M.
Burwood, L. F.	S. Cdr.	M.S.M.
Bush, A. G.	Cdr.	M.S.M.

APPENDIX IX

375

Butler, N. G.	S. Sgt.	M.S.M.
Butterfield, W.	S. Sgt.	M.S.M.
Butterwick, J. H.	S. Sgt.	M.S.M.
Byrom, J.	At. S.M.	M.S.M.
Calistri, P. F.	Sgt.	Portuguese Military Medal for Good Service
Cameron, H. R.	S. Cdr.	M.S.M.
Cameron, K.	S. Cdr.	M.S.M.
Carnell, A. J.	Cpl.	M.S.M.
Carolan, W.	S. Cdr.	M.S.M.
Carpenter, W.	S. Q.M.S.	M.S.M.
Carr, L. O.	Ar. S. Sgt.	M.S.M.
Carter, H.	Cpl.	M.S.M.
Caselton, E. J.	S. Cdr.	M.S.M.
Cashman, E. J.	Cdr.	M.S.M.
Caswell, C. L.	At. S. Sgt.	M.S.M.
Chadwick, S. V.	S. Cdr.	M.S.M.
Challoner, F. J.	At. S.M.	M.S.M.
Chandler, H. A. V.	S. Q.M.S.	M.S.M.
Chapman, J. E.	Sgt.	M.S.M.
Charnock, N. H.	S. Cdr.	M.S.M.
Chate, W. L.	Sgt.	M.M.
Chatwin, T. J.	Ar. S. Sgt.	M.S.M.
Cheetham, L. J.	Pte.	Promoted Corporal.
Cheney, G.	Cdr.	M.B.E.
Chisholm, W. A.	S. Cdr.	M.S.M.
Chitty, P. W.	S. Cdr.	M.S.M.
Christian, R. F.	S. Cdr.	M.S.M.
Christie, A.	At. S.M.	M.S.M.
Christy, A.	Cdr.	M.S.M.
Clague, W. A.	S. Cdr.	M.S.M.
Claireaux, J. T.	At. S. Sgt.	M.S.M., Good Service Medal (with swords), 2nd Class (Rouman- ian). Silver Medal on the Riband of St. Stanislas.
Clark, S. C.	S. Cdr.	M.S.M.
Clarke, A. C. H.	S. Sgt.	M.S.M.
Clarke, H. W.	S. Cdr.	M.S.M.
Clarke, W. B.	S. Q.M.S.	M.S.M.
Clarke, W. G.	S. Sgt.	M.S.M.

APPENDIX IX

Clayton, A.	S. Sgt.	M.S.M.
Clement, H. E.	S. Sgt.	M.S.M.
Clemmit, W.	Pte.	M.S.M.
Coates, A. E.	Ar. S. Sgt.	M.S.M.
Coe, A. W.	At. S. Sgt.	M.M.
Colborn, A. W.	Sgt.	Medaille d'Honneur avec Glaives (en Argent).
Cole, J. W.	S. Cdr.	M.S.M.
Collier, T. F.	At. S.M.	M.S.M.
Collins, J.	S. Cdr.	M.S.M.
Collins, L. J.	S. Cdr.	M.S.M.
Comaskey, D. W.	Ar. S. Sgt.	M.S.M.
Condron, A.	Cdr.	M.S.M.
Connelly, W.	S. Cdr.	M.S.M.
Conyers, A. W.	Cdr.	M.S.M.
Coombes, P. H.	At. S.M.	M.S.M.
Coop, T.	Cdr.	M.S.M.
Cooper, G.	At. S. Sgt.	M.M.
Copper, R.	L. Cpl.	M.S.M.
Corbin, T. F.	Pte.	M.M.
Corney, H.	S. Cdr.	M.S.M.
Cornish, F. G.	2/Cpl.	M.S.M.
Costigan, F. R.	Cdr.	M.C., M.S.M.
Cowley, W. T.	S. Cdr.	M.S.M.
Cox, A.	At. S. Sgt.	Croix de Guerre (Belgium).
Cox, C. F.	Ar. S. Sgt.	M.S.M.
Cox, F. J.	Cdr.	M.B.E., M.S.M., Medaille d'Honneur avec Glaives (en Argent).
Crawford, A.	Sgt.	M.S.M.
Crawford, J.	Cdr.	M.S.M.
Cremin, D.	S. Sgt.	M.S.M.
Cresswell, H. B.	Cdr.	M.S.M.
Cresswell, T. E.	S. Cdr.	M.S.M.
Crew, E. T.	Sgt.	M.S.M.
Cribb, W.	Ar. S. Sgt.	M.S.M.
Cripwell, S. T.	S. Sgt.	M.S.M.
Crisp, E.	Cpl.	M.S.M.
Crofts, W.A.	S. Sgt.	M.S.M.
Crombie, W. H. D.	Pte.	D.C.M.
Crosbie, R.	At. S. Sgt.	M.M.

APPENDIX IX

377

Cross, F. J.	Sgt.	M.M. and Bar.
Crouch, S. H.	S. Cdr.	M.S.M.
Crow, W. R.	S. Sgt.	M.S.M.
Cruikshank, A.	S. Sgt.	M.S.M.
Cruikshank, A.	Sgt.	Medaille d'Honneur avec Glaives (en Bronze).
Crutchley, A.	S. Cdr.	M.S.M.
Cubitt, E. A.	Pte.	M.S.M.
Cullen, R. K.	S. Cdr.	M.S.M.
Cullum, H. J.	Sgt.	M.M.
Cullum, W. G.	S. Cdr.	M.S.M.
Cunningham, A.	S. Cdr.	M.S.M.
Cutler, L.	S. Cdr.	Medaille d'Honneur avec Glaives (en Argent).
Dalton, J.	S. Cdr.	M.S.M.
Dams, H.	S. Sgt.	M.S.M.
Daniels, T. B.	S. Cdr.	M.S.M.
Darley, W. F.	S. Sgt.	M.S.M.
Davis, J. L.	At. S. Sgt.	M.M.
Davison, J. E.	S. Cdr.	M.S.M.
Davison, W.	S. Cdr.	M.S.M.
Dawson, P.	At. S. Sgt.	Croix de Guerre (Belgium).
Day, W. H.	S. Cdr.	M.S.M.
Deacon, W. G.	S. Cdr.	M.S.M., Medaille d'Honneur avec Glaives (en Bronze).
Dealtry, W.	S. Cdr.	M.S.M.
Deamer, E.	S. Q.M.S.	M.S.M.
Dean, G. A.	2/Cpl.	M.M.
Denham, T. V.	Ar. S. Sgt.	Silver Medal on the Riband of St. Stanislas.
Dennis, A. J.	At. S. Sgt.	M.M.
Denton, J. H.	S. Cdr.	Medaille d'Honneur avec Glaives (en Argent).
Derrick, A. P.	At. S.M.	M.S.M.
Dersley, J.	Pte.	M.S.M. Medaille d'Honneur avec Glaives (en Bronze).

Dewdney, J.	Sgt.	M.S.M.
Dickon, J.	At. S. Sgt.	M.S.M.
Dickson, W. J.	S. Sgt.	M.S.M.
Digard, E. E.	Sgt.	M.M.
Diver, G.	Cdr.	M.S.M.
Dobson, F. G.	At. S. Sgt.	M.M.
Dobson, H.	At. S. Sgt.	M.S.M.
Dobson, P.	At. S. M.	M.S.M.
Dodds, R.	At. S. Sgt.	Silver Medal on the Riband of St. Stanislas.
Dodds, W. P.	S. Cdr.	M.S.M.
Dolley, L. W.	S. Cdr.	M.S.M.
Donald, R.	S. Cdr.	Silver Medal on the Riband of St. Stanislas.
Donaldson, E.	Cdr.	M.S.M.
Doncaster, C. W.	S. Cdr.	M.S.M.
Dowdall, W. E.	Cpl.	M.S.M.
Dowell-McDowell, A. M.	S. Q.M.S.	M.S.M.
Down, W. G.	S. Sgt.	M.S.M.
Drake, C. K.	At. Q.M.S.	M.S.M.
Drew, J.	At. S. Sgt.	D.C.M.
Drewitt, W.	At. S. Sgt.	Bronze Medal for Military Valour (Italy)
Driver, T. W.	S. Cdr.	M.S.M.
Duce, E. A.	Ar. S. Sgt.	D.C.M.
Dudley, T. H.	Ar. S. Sgt.	M.S.M.
Dungey, R. J.	S. Sgt.	M.S.M.
Dunkerley, E.	At. S. Sgt.	M.S.M.
Dunn, E.	Sgt.	M.S.M.
Dunn, W.	L. Sgt.	M.M.
Durrant, D. E.	Sgt.	M.S.M.
Easton, A.	L. Cpl.	M.S.M.
Eaton, C.	S. Cdr.	M.S.M.
Eames, T. G.	Cpl.	M.S.M.
Edge, J. A.	Pte.	M.M.
Edwards, E. J.	S. Cdr.	M.S.M.
Edwards, J. H.	Cdr.	M.B.E.
Edwards, W. B. W.	Sgt.	M.S.M.
Ellis, W.	S. Cdr.	M.S.M.
Erskine, G. A.	Ar. S. Sgt.	M.S.M.
Evans, E. H. M.	Sgt.	M.M.

APPENDIX IX

379

Fairweather, A.	Ar. S. Sgt.	M.S.M.
Fallowfield, B.	Cdr.	M.S.M.
Fanning, D.	Sgt.	M.S.M.
Farmer, A. W.	Ar. S. Sgt.	M.S.M.
Farrant, F. H.	S. Cdr.	M.S.M.
Fenn, E.	Sgt.	M.S.M.
Fenn, S. A.	Cdr.	M.B.E., M.S.M.
Fenwick, R. J.	S. Cdr.	M.S.M.
Field, B.	S. Sgt.	M.M.
Field, J. F.	S. Cdr.	M.S.M.
Figures, W. S.	At. S. Sgt.	M.S.M.
Finch, W.	S. Sgt.	M.S.M.
Finnigan, J. H.	At. S. Sgt.	M.M.
Firth, J. E.	Sgt.	M.S.M.
Fisher, G. W.	Ar. S. M.	M.S.M.
Fisher, W. J.	At. S. Sgt.	M.S.M.
Fishwick, O.	Cdr.	M.S.M.
Fletcher, J. G.	Sgt.	M.S.M.
Foden, W. M.	S. Cdr.	M.S.M.
Fogg, H.	S. Cdr.	M.S.M.
Ford, H. D.	Ar. S. Sgt.	M.S.M.
Forrest, H.	Pte.	Croce di Guerra.
Foster, A. E.	At. S.M.	M.B.E., M.S.M., Medaille d'Honneur avec Glaives (en Argent).
Fox, C. J.	At. S.M.	M.S.M.
Frankland, H.	At. S. Sgt.	M.M.
Franklin, C.	S. Cdr.	M.S.M.
Freck, P.	S. Cdr.	M.S.M.
Freeear, H.	S. Cdr.	M.S.M.
Freeman, N. A.	S. Cdr.	M.S.M.
Freemantle, A. W.	S. Cdr.	M.S.M.
Fretwell, W.	S. Cdr.	M.S.M.
Frier, J.	At. S.M.	M.S.M.
Fry, E. H.	S. Cdr.	M.S.M.
Fuller, S. H.	At. S. Sgt.	M.M.
Gallagher, W.	Sgt.	M.S.M.
Galletley, M. G.	S. Sgt.	M.S.M.
Gamlén, T. H.	S. Sgt.	M.S.M.
Gardner, F. W.	Cdr.	D.C.M.
Gardner, H. L. F.	S. Cdr.	M.S.M.
Garner, O. P. H.	S. Cdr.	M.S.M.

Garnett, A. E.	S. Q.M.S.	Medaille d'Honneur avec Glaives (en Bronze).
Garvey, W.	Pte.	M.M.
Gascoyne, R. E.	At. S. Sgt.	D.C.M., M.S.M.
Gatenby, R.	S. Cdr.	M.S.M.
George, A. A.	At. S. Sgt.	M.S.M.
George, J. C.	Cpl.	M.M.
Gibbon, T. A.	Cdr.	D.C.M.
Gibson, C.	S. Cdr.	M.S.M.
Gibson, W.	S. Sgt.	M.S.M.
Giddings, F. M.	Sgt.	M.S.M.
Giddings, G. H. L.	Cpl.	M.S.M.
Giggal, A. J.	At. S. Sgt.	M.M.
Gladman, J. A.	Sgt.	M.S.M.
Glass, D.	At. S. Sgt.	D.C.M.
Godden, J. R.	S. Sgt.	M.S.M.
Godfrey, C. V.	S. Sgt.	M.S.M.
Godwin, R. S.	Cpl.	M.S.M.
Goldthorp, H.	S. Sgt.	M.S.M.
Gooch, F. S.	Cpl.	M.S.M.
Goodall, J. W.	L. Cpl.	M.S.M.
Goode, E. E.	At. Q.M.S.	M.S.M.
Goodey, F.	S. Cdr.	M.S.M.
Goodwin, W. H.	Ar. Q.M.S.	M.S.M.
Goody, B. W.	S. Cdr.	M.S.M.
Goose, J. R.	Cdr.	M.S.M.
Gould, W. H.	S. Cdr.	M.S.M.
Gower, W.	Sgt.	M.S.M.
Gracey, W.	Sgt.	M.S.M., Medaille Barbatie si Credinta (2nd Class).
Gray, E. E.	Cdr.	M.S.M.
Green, A. H.	Sgt.	M.S.M.
Green, A. T.	S. Cdr.	M.S.M.
Greenslade, W. S.	Sgt.	M.S.M.
Griffin, H. R.	S. Cdr.	M.S.M.
Griffiths, C. H.	S. Cdr.	M.S.M.
Guest, J. D.	Ar. Q.M.S.	M.M.
Gundel, W. D.	Ar. S. Sgt.	D.C.M., Cross of St. George (3rd Class).
Gunning, E.	S. Sgt.	M.S.M.
Guy, H.	Sgt.	M.S.M.

APPENDIX IX

381

Hackman, G. T.	S. Sgt.	M.S.M.
Hackney, C.	Sgt.	M.S.M.
Hadland, P. A.	Cdr.	D.C.M., Medaille Militaire.
Hadley, A. A.	At. S. Sgt.	M.S.M.
Haick, S. C.	S. Cdr.	M.S.M.
Hale, P. F.	At. S.M.	D.C.M., M.S.M.
Hall, D.	Ar. S. Sgt.	M.S.M.
Hall, E. H.	S. Cdr.	M.S.M.
Hall, P.	S. Sgt.	M.S.M., Silver Medal of St. Anne (2nd Cl.).
Hall, R.	At. S. Sgt.	M.S.M.
Hall, W. C. A.	At. S. Sgt.	M.S.M.
Hall, W. Q.	At. S. Sgt.	M.S.M.
Halnan, E.	S. Sgt.	M.S.M.
Hamley, S. C.	S. Cdr.	D.C.M.
Hammersley, A. G.	At. S.M.	M.S.M.
Hammond, C. W.	Sgt.	M.S.M.
Hanchard, S. A.	S. Sgt.	M.S.M.
Hardie, W.	L. Sgt.	M.S.M.
Harding, A. S.	S. Cdr.	M.S.M.
Harding, T.	S. Cdr.	D.C.M.
Hardy, G.	Cdr.	M.S.M.
Hardy, L.	Cdr.	M.S.M.
Harmsworth, R.	S. Cdr.	M.S.M.
Harris, A. E.	S. Cdr.	M.M., M.S.M.
Harris, G. L.	S. Cdr.	D.C.M.
Harris, S.	At. S. Sgt.	D.C.M.
Harrison, A. T.	At. S. Sgt.	M.S.M.
Hart, H. T.	S. Sgt.	M.S.M.
Hart, J. A.	Cdr.	M.S.M.
Hartley, C. H.	At. S. Sgt.	M.S.M.
Hawkes, F. C.	Pte.	M.S.M.
Hawkins, C. H.	S. Sgt.	M.S.M.
Haynes, F. H.	At. S.M.	M.S.M.
Haynes, L.	At. S. Sgt.	M.M., Croix de Guerre, Ordre de Leopold II, Chevalier (Belgium).
Head, J. N.	S. Cdr.	M.S.M.
Heald, H.	S. Cdr.	M.S.M.
Healy, N. E. W.	Cdr.	M.S.M.
Hearne, A. T.	S. Sgt.	M.S.M.

APPENDIX IX

Hennig, S. W.	Cpl.	M.M.
Henry, G.	Ar. Q.M.S.	M.S.M.
Hicks, A. S.	S. Cdr.	M.B.E., M.S.M.
Highcock, F.	S. Cdr.	M.S.M.
Hildyard, E. J.	S. Cdr.	M.M.
Hilkene, A.	At. S. Sgt.	M.S.M.
Hill, H.	At. S. Sgt.	M.S.M.
Hilton, R. A.	Cdr.	M.S.M.
Hitchens, S. H.	At. S.M.	M.S.M.
Hoare, A.	S. Sgt.	M.S.M.
Hoare, H.	S. Cdr.	M.S.M.
Hobling, L. C.	S. Cdr.	M.S.M.
Hodgkinson, H.	At. S. Sgt.	M.M.
Hodson, F.	Pte.	Medaille d'Honneur avec Glaives (en Bronze).
Hold, H.	Cdr.	M.S.M.
Holland, F. W.	Cdr.	M.S.M.
Holland, G.	Pte.	M.M.
Holliday, J. J.	Ar. S. Sgt.	M.S.M.
Holloway, G. H.	S. Q.M.S.	M.S.M.
Holloway, R.	S. Sgt.	M.S.M.
Holmes, A.	S. Cdr.	M.S.M.
Honey, N.	Cdr.	M.S.M.
Honnor, B. A.	Ar. S.M.	M.S.M.
Hooker, A.	At. S.M.	M.S.M.
Hool, P. W.	S. Cdr.	M.S.M.
Hooper, W. O.	At. S. Sgt.	M.S.M.
Hopkins, F. J.	Sgt.	M.S.M.
Hopper, J.	At. S. Sgt.	M.S.M.
Hopwood, F.	Pte.	M.S.M.
Horsfield, E.	At. S. Sgt.	M.S.M.
Horsman, J.	2/Cpl.	M.S.M.
House, R. A.	Sgt.	M.S.M.
Howard, F.	Ar. S. Sgt.	M.S.M.
Howie, C. C. C. McK.	S. Cdr.	M.S.M.
Howling, A.	S. Q.M.S.	M.S.M.
Hudson, A.	Sgt.	M.S.M.
Hughes, G. F.	Cdr.	M.S.M.
Hunt, A.	S. Cdr.	M.S.M.
Hunt, F. W.	At. S.M.	M.S.M.
Hunt, P. F. C.	Sgt.	M.S.M.
Hurley, J. W.	At. S. Sgt.	M.S.M.
Hurrell, H. R.	S. Cdr.	M.S.M.

APPENDIX IX

383

Hurst, H. O.	Sgt.	M.S.M.
Hutchinson, T.	Sgt.	Portuguese Military Medal for Good Service.
Hynd, L. H.	S. Cdr.	M.S.M.
Iddison, H.	S. Cdr.	M.S.M.
Inglefield, F. G.	S. Cdr.	M.S.M.
Ingram, E. D.	Sgt.	M.S.M.
Irwin, J. J.	Pte.	M.S.M.
Isaacs, C.	S. Sgt.	M.S.M.
Isaacs, G.	S. Cdr.	M.S.M.
Jackson, F.	Sgt.	M.S.M.
Jagger, H. G. F.	S. Cdr.	M.S.M.
James, A.	Cpl.	M.S.M.
James, V. G.	Pte.	M.S.M.
Jasper, A. W.	S. Sgt.	M.M.
Jeanes, H. W.	At. S.M.	M.M.
Jeffery, W.	S. Cdr.	M.S.M.
Jewell, W. J.	L. Sgt.	M.S.M.
Johnson, F.	S. Cdr.	M.S.M.
Johnson, O.	L. Sgt.	M.S.M.
Johnston, A. S.	Cdr.	M.S.M.
Joines, W.	Ar. S. Sgt.	M.S.M.
Jolley, T. W.	S. Sgt.	M.S.M.
Jolliffe, W. G. S.	At. S.M.	M.S.M.
Jones, A.	Sgt.	M.S.M.
Jones, A.	S. Cdr.	M.S.M.
Jones, A. E.	Cdr.	M.S.M.
Jones, A. E.	Ar. S. Sgt.	M.S.M.
Jones, E. E.	L. Cpl.	M.S.M.
Jones, E. S.	S. Q.M.S.	M.S.M.
Jones, F. R.	Cdr.	M.S.M., Medaille Militaire.
Jones, H.	Cpl.	M.M.
Jones, J.	Pte.	M.S.M.
Jones, J. H.	S. Cdr.	M.S.M.
Jones, S.	At. S. Sgt.	D.C.M.
Jordan, E. W. G.	S. Cdr.	M.S.M.
Jordan, H.	S. Q.M.S.	M.S.M.
Joseph, F.	At. S. Sgt.	M.S.M., Silver Medal on the Riband of St. Stanislas.

Journeaux, C. G.	S. Cdr.	M.S.M., Croix de Guerre.
Joy, F. G.	Cpl.	M.S.M.
Joyce, G. E.	Sgt.	M.S.M.
Joyce, J. H.	S. Cdr.	M.S.M.
Joyce, S.	Cdr.	M.B.E.
Joyce, S. G.	S. Cdr.	M.S.M.
Keen, W. A.	S. Sgt.	M.S.M.
Keene, W.	S. Sgt.	Silver Medal on the Riband of St. Stanislas.
Keightly, A. C.	S. Cdr.	M.S.M.
Kellock, A.	S. Cdr.	M.B.E., M.S.M., Medaille d'Honneur avec Glaives (en Argent).
Kelly, A. H.	S. Cdr.	M.S.M.
Kember, E. H.	Cdr.	M.S.M.
Kember, J.	Sgt.	M.S.M.
Kent, H. V.	Cdr.	M.S.M.
Kent, L. J.	S. Q.M.S.	M.S.M.
Kenzie, B. C.	At. S.M.	M.S.M.
Kerslake, W. H.	At. S. Sgt.	M.S.M.
Killick, A. J.	At. S. Sgt.	M.S.M.
King, J. H.	Ar. S. Sgt.	M.S.M.
Kinross, J.	S. Sgt.	M.S.M.
Kinsella, A. F.	S. Cdr.	M.S.M.
Kirby, C. E.	Ar. S. Sgt.	M.S.M.
Kirby, R.	S. Cdr.	M.S.M.
Knight, H. T.	At. S. M.	M.S.M.
Knight, W.	Sgt.	M.S.M.
Knight, W. H.	At. S.M.	M.S.M.
Knights, C. C.	S. Q.M.S.	Medaille d'Honneur avec Glaives (en Bronze).
Lacey, S.	Sgt.	Silver Medal on the Riband of St. Stanislas.
Lamb, A.	Cdr.	M.S.M.
Lambert, W. F.	Cpl.	M.M.
Lamman, A. H.	S. Cdr.	M.S.M.
Lane, S.	Pte.	M.M.
Lang, T. H.	S. Cdr.	M.S.M.

Langley, A.	Ar. S. Sgt.	M.S.M.
Langley, F. C.	Cdr.	M.S.M.
Langrish, J. J.	S. Cdr.	M.S.M.
Larcher, S. H.	S. Cdr.	M.S.M., Medaille d'Honneur avec Glaives (en Argent).
Lawley, L.	At. S.M.	M.S.M.
Lawrence, A. E.	Sgt.	M.S.M.
Lawson, W.	Sgt.	M.S.M.
Lawton, J. A.	S. Cdr.	M.S.M.
Leach, H.	S. Cdr.	M.S.M., Medaille d'Honneur avec Glaives (en Argent).
Leach, W. J.	S. Cdr.	M.S.M.
Leaney, F. G.	Cdr.	D.C.M., M.S.M.
Leatherbarrow, J. K.	S. Q.M.S.	M.S.M.
Le Cheminant	S. Cdr.	M.S.M.
Leite, V. P.	Pte.	Portuguese Military Medal for Good Service.
Leonard, F.	Ar. Q.M.S.	M.S.M.
Le Petit, W. J.	At. S.M.	D.C.M., M.S.M.
Le Roy, D.	Cdr.	M.B.E., M.S.M.
Leslie, W. S.	At. S. Sgt.	M.M.
Lewarn, H. S.	Cdr.	M.B.E., M.S.M.
Lewis, J.	Cdr.	M.S.M.
Lewis, T.	At. S. Sgt.	M.S.M., Croix de Guerre, (Belgium) Ordre de Leopold II, Chevalier.
Lilley, W. A.	Cdr.	M.S.M.
Lillywhite, J.	Cdr.	M.S.M.
Little, J. M.	S. Cdr.	M.S.M.
Littleton, G.	At. S.M.	M.S.M.
Llewellyn, T. J.	At. S.M.	M.S.M.
Lloyd, B.	Pte.	M.M.
Lloyd, F. C.	S. Cdr.	M.S.M.
Lloyd, W. J.	S. Cdr.	M.S.M.
Loakman, B. J.	Sgt.	M.S.M.
Long, G.	Ar. S. Sgt.	M.S.M.
Long, K.	Ar. S. Sgt.	M.S.M.
Long, L. R.	S. Cdr.	M.S.M.
Longhurst, W. L.	S. Cdr.	M.S.M.

Longstaff, H.	S. Cdr.	M.S.M.
Longstaff, J. W.	At. S.M.	M.S.M., Medaille Barbatie si Credinta, 2nd Class (Roumania).
Lorimer, S. K.	Sgt.	Portuguese Military Medal for Good Service.
Lovegrove, A. E.	S. Sgt.	M.S.M.
Lowe, H. H.	At. S. Sgt.	M.M.
Lowe, S. G.	S. Cdr.	M.S.M.
Lucas, F.	At. S. Sgt.	M.M.
Lumsden, G. S.	Cdr.	M.S.M.
Luntley, J.	S. Sgt.	M.S.M.
Lynam, J. M.	S. Cdr.	M.C.
Machin, E. A.	Cdr.	M.S.M.
MacInnis, J.	At. S. Sgt.	D.C.M.
Mack, J. W.	Pte.	M.M.
Mackereth, W.	At. S. Sgt.	M.S.M.
Mackey, J.	S. Sgt.	M.S.M.
Madden, F. C.	At. Q.M.S.	M.S.M.
Maile, A. C.	Cdr.	M.B.E., M.S.M.
Major, J.	S. Cdr.	M.S.M.
Malcolm, A.	Cdr.	M.C.
Mallen, G. K.	S. Q.M.S.	M.S.M.
Manning, H. A.	S. Cdr.	M.S.M., Portuguese Military Medal for Good Service.
Manvell, W.	Ar. S. Sgt.	M.S.M.
March, C.	S. Cdr.	M.S.M.
Markey, L. E.	At. S. Sgt.	M.S.M.
Marquis, E.	C. Cdr.	M.S.M.
Marsh, E. W.	S. Cdr.	M.S.M.
Martin, A. W.	Cdr.	M.B.E., M.S.M.
Martin, F. V.	S. Sgt.	M.S.M.
Martin, G.	S. Q.M.S.	M.S.M.
Martin, J.	S. Cdr.	M.S.M.
Martin, W. H.	S. Cdr.	M.S.M.
Mason, H.	S. Cdr.	M.S.M.
Mason, H. S.	Sgt.	M.S.M.
Mathews, G. A.	Cdr.	M.B.E., M.C.
Maunder, E. W.	At. S.M.	M.S.M.
May, H. T.	S. Cdr.	M.S.M.
Mayell, A.	At. S.M.	M.S.M.

APPENDIX IX

387

McAinsh, W.	Sgt.	M.S.M.
McCormick, M. P.	Sgt.	Portuguese Military Medal for Good Service.
McDonald, C.	Sgt.	M.M.
McDougal, G. M.	At. S. Sgt.	M.S.M.
McFarlane, A.	S. Sgt.	M.S.M., Silver Medal on the Riband of St. Stanislas.
McGaffney, J.	S. Cdr.	M.S.M.
McIntosh, J. S.	Sgt.	M.S.M.
McPhail, A.	Pte.	M.M.
McSweeney, D.	Cdr.	M.S.M.
Meakin, G.	Sgt.	M.S.M.
Mee, E. J.	S. Cdt.	M.S.M.
Meeson, G. F.	S. Cdr.	M.S.M.
Mellor, J.	Ar. S. Sgt.	M.S.M.
Melville, A.	At. S. Sgt.	M.M.
Meredith, F. S.	2/Cpl.	M.S.M.
Mew, A. H.	At. S. Sgt.	Croce di Guerra.
Middleton, R.	S. Cdr.	M.S.M.
Middleton, W. G.	At. S. Sgt.	M.S.M.
Miller, F. H.	S. Sgt.	M.S.M.
Mills, C.	Cdr.	D.C.M.
Mitchell, W. J.	Ar. S. Sgt.	M.S.M.
Mockler, W. H. F.	S. Cdr.	M.S.M.
Moffatt, D. J.	Sgt.	M.S.M.
Moloney, P. J.	Cdr.	D.C.M.
Molyneux, A.	At. S. Sgt.	M.M.
Monkhouse, T.	At. Q.M.S.	M.S.M.
Moore, J. T.	Cpl.	M.S.M.
Morgan, F.	S. Cdr.	Medaille Militaire.
Morgan, H.	S. Q.M.S.	M.S.M.
Morgan, J. C.	Sgt.	M.S.M.
Morley, F. G.	Cdr.	M.C.
Morrell, F. G.	Sgt.	M.S.M.
Morris, W. J.	Sgt.	M.S.M.
Morrison, G. A.	Ar. S. Sgt.	M.S.M.
Morton, H. R.	S. Cdr.	M.S.M.
Moth, P.	At. S.M.	M.S.M.
Mousley, W. J.	Ar. S. Sgt.	M.S.M.
Muir, A. J.	S. Cdr.	M.S.M.
Mulhall, J.	S. Sgt.	M.S.M.
Munday, A. T.	Ar. S. Sgt.	M.S.M.

APPENDIX IX

Murray, D.	Cdr.	D.C.M.
Murrell, A. E.	At. S.M.	M.S.M.
Myers, W. T.	Sgt.	M.S.M.
Nagle, G. E.	Pte.	M.S.M.
Nash, J.	S. Cdr.	M.M.
Natzler, G.	S. Cdr.	M.S.M.
Naylor, H. B.	S. Cdr.	M.S.M.
Neale, D. W.	S. Cdr.	M.S.M.
Neighbour, J. W.	S. Sgt.	M.S.M.
Newby, W.	S. Cdr.	M.S.M.
Newens, H. W.	L. Cpl.	Silver Medal on the Riband of St. Stanislas.
Negus, R.	At. S. Sgt.	M.S.M.
Nicholas, F. U.	Cdr.	M.S.M.
Nickolds, E. S.	At. S.M.	Croix de Guerre.
Nowlan, A. J.	2/Cpl.	M.S.M.
Noyce, D. F.	L. Cpl.	Croix de Guerre.
Nunn, F. A.	Sgt.	Medaille d'Honneur avec Glaives (en Bronze).
Obee, A. L.	At. Q.M.S.	M.M.
O'Connor, D. G.	S. Sgt.	M.S.M.
Ogden, W. G.	At. S.M.	M.C.
Ogg, L. K.	S. Cdr.	M.S.M.
Oliver, E. J.	At. S.M.	M.S.M.
Oliver, H.	S. Cdr.	M.S.M.
Osman, J. A.	Cdr.	M.S.M.
Overall, W. A.	S. Cdr.	M.S.M.
Owen, H.	At. S. Sgt.	D.C.M.
Owen, H. A.	Pte.	M.S.M.
Owen, F. R.	Cdr.	M.S.M.
Page, C. F.	S. Cdr.	M.S.M.
Page, J. F.	S. Cdr.	M.S.M.
Pallin, T. G.	Sgt.	M.S.M.
Palmer, A.	S. Cdr.	M.S.M.
Palmer, A. E. J.	Cdr.	M.S.M.
Palmer, M.	Pte.	M.M.
Pankhurst, G.	Pte.	M.S.M.
Parker, W.	S. Cdr.	M.S.M.
Parkin, G.	Cdr.	D.C.M., M.S.M.

Parr, C.	S. Sgt.	M.S.M.
Parsons, W. J.	At. S.M.	M.S.M.
Patrick, H. F.	S. Cdr.	M.S.M.
Payne, T.	S. Cdr.	M.B.E.
Paull, W. J.	Pte.	M.S.M.
Payne, W. H.	S. Sgt.	M.S.M.
Peake, F. E.	At. S.M.	D.C.M., M.S.M.
Pearce, H. W.	L. Sgt.	M.S.M.
Pearce, W. R.	At. S.M.	M.S.M.
Pearman, R. J.	Cdr.	M.S.M.
Peat, J. A.	Pte.	Croce di Guerra.
Peck, C. D.	S. Cdr.	M.S.M.
Pedley, F.	S. Cdr.	M.S.M.
Peel, J. P.	At. S.M.	M.S.M.
Pepper, W. H.	Ar. S.M.	M.S.M.
Perkins, J. B.	At. S. Sgt.	M.M.
Perkins, J. W. H.	Cpl.	M.S.M.
Perkis, J. R.	2/Cpl.	M.S.M.
Perrin, E. J.	Cdr.	M.S.M.
Perry, F. G.	At. S.M.	M.S.M.
Peters, H. J.	Ar. S. Sgt.	M.S.M.
Peters, R.	Pte.	M.S.M.
Peters, S. G.	Cdr.	M.S.M.
Petherham, B.	Sgt.	M.S.M.
Pettitt, N.	S. Cdr.	M.S.M.
Phelps, H. H.	S. Sgt.	M.S.M.
Phillips, H. J.	Sgt.	M.S.M.
Philpott, H. S.	S. Cdr.	M.S.M.
Pickering, A.	At. S. Sgt.	M.M.
Pickering, W. K.	S. Cdr.	M.S.M.
Pinder, A.	Pte.	M.M.
Pollard, A. T.	Pte.	M.S.M.
Ponting, S. F.	S. Cdr.	M.S.M.
Poole, F.	Ar. S. Sgt.	M.S.M.
Poole, W. R.	Sgt.	M.S.M.
Pope, E. T.	Pte.	M.M.
Preston, H. J.	Sgt.	M.S.M.
Primrose, A.	At. S. Sgt.	D.C.M.
Prince, P. A.	S. Cdr.	M.S.M.
Prior, F. E.	S. Cdr.	M.S.M.
Pritchard, E.	Cpl.	M.S.M.
Pritchard, F. P.	S. Sgt.	M.S.M.
Pritchard, G.	Cdr.	M.B.E., M.S.M.
Procter, E.	Ar. S.M.	M.S.M.

Quinn, M.	S. Cdr.	M.S.M.
Rackley, P. A.	S. Cdr.	D.C.M.
Radford, T. A.	S. Sgt.	Medaille d'Honneur avec Glaives (en Bronze).
Randell, J.	Cdr.	M.S.M.
Rapple, R.	S. Cdr.	M.S.M.
Rawlinson, E.	S. Cdr.	M.S.M.
Reader, H. N.	S. Cdr.	M.S.M.
Reay, G. E.	S. Sgt.	M.S.M.
Reed, A. H.	Cpl.	M.S.M.
Reeds, H. D.	At. S.M.	M.S.M.
Redfearn, T.	S. Cdr.	M.S.M.
Rees, T. J.	S. Cdr.	M.S.M.
Reeve, A. J.	S. Sgt.	Portuguese Military Medal for Good Service.
Reeves, F. J.	S. Cdr.	M.S.M.
Reeves, G. L.	S. Cdr.	M.S.M.
Reilly, J.	S. Cdr.	M.S.M.
Rewhorn, T.	S. Cdr.	M.S.M.
Reynolds, A. B.	At. S.M.	M.S.M.
Rice, C. M.	Cdr.	M.S.M., Medaille d'Honneur avec Glaives (en Argent)
Richards, A.	S. Sgt.	M.S.M.
Richards, W. H.	S. Cdr.	M.S.M.
Richardson, G. H.	At. S. Sgt.	M.S.M.
Richardson, S. E.	Cdr.	M.S.M.
Ricketts, C. W.	S. Cdr.	M.S.M.
Ridout, H. A. W.	S. Cdr.	M.S.M.
Rielly, J. B.	At. S. Sgt.	M.S.M.
Riggs, P.	Sgt.	M.S.M.
Riley, W.	L. Sgt.	M.S.M.
Ring, M. H.	Pte.	M.M.
Ripton, W.	Sgt.	M.S.M.
Ritchie, R. J.	S. Sgt.	M.S.M.
Roberts, D. C.	S. Sgt.	M.S.M.
Roberts, E.	Cdr.	M.S.M.
Roberts, F.	Sgt.	M.S.M.
Roberts, R. H.	S. Cdr.	M.S.M.
Robertson, J.	Sgt.	M.M.
Robinson, C. E.	Cdr.	M.S.M.

APPENDIX IX

391

Roddis, A. J.	Sgt.	M.S.M.
Rogers, A.	S. Sgt.	M.S.M.
Rogers, W. D.	Cdr.	M.C.
Rolland, O. D.	S. Cdr.	M.S.M.
Roper, L. J.	Cdr.	M.S.M.
Rose, C. M.	S. Cdr.	M.S.M., Croix de Guerre (Belgium).
Rose, H.	S. Cdr.	M.S.M.
Rose, H. G.	Ar. S.M.	M.S.M.
Rose, W. B.	At. S. Sgt.	M.M., M.S.M.
Rosindale, F.	Sgt.	M.S.M.
Roughsedge, R. L.	Sgt.	M.S.M.
Russell, J. J.	Sgt.	M.S.M.
Russell, W. J.	Sgt.	M.S.M.
Ryan, H. M.	S. Cdr.	M.S.M.
Salter, J.	S. Cdr.	M.S.M.
Sampson, F. W. H.	S. Sgt.	M.S.M.
Sanders, A.	S. Sgt.	M.S.M.
Sanders, C. H.	S. Cdr.	M.M.
Sanders, J.	Ar. S. Sgt.	M.M.
Sargeant, F. H.	Pte.	M.S.M.
Saunders, F. J.	S. Cdr.	M.S.M.
Savage, T.	S. Sgt.	M.S.M.
Sayer, J. A.	Ar. S. Sgt.	M.S.M.
Scarr, H. B.	At. S. Sgt.	M.S.M.
Scott, E. O.	At. S.M.	M.S.M.
Scott, F. W.	At. S. Sgt.	M.M.
Scott, H. R.	S. Cdr.	M.S.M.
Scott, W. C.	S. Cdr.	M.S.M.
Scully, W. F.	Pte.	Gold Medal (Serbia).
Seaton, F. J.	Ar. S. Sgt.	M.S.M.
Sedgwick, J.	S. Cdr.	M.S.M.
Sess, W.	Cpl.	M.S.M.
Seyde, H.	Cdr.	M.S.M.
Sharman, B. J.	S. Sgt.	M.S.M.
Sharpe, F. R.	At. S.M.	M.S.M.
Shelton, C. S.	S. Sgt.	M.S.M.
Shepherd, A.	Cdr.	M.S.M.
Shepherd, A.	S. Cdr.	Silver Medal on the Riband of St. Stanislas.
Shepherd, R. G.	At. S.M.	M.M., M.S.M.
Shepherd, S.	S. Cdr.	M.S.M.

APPENDIX IX

Shield, S.	S. Cdr.	M.S.M.
Shipton, W. J.	L. Sgt.	M.S.M.
Short, F. P.	At. S.M.	M.S.M.
Shuster, R.	At. S. Sgt.	M.M.
Sidney, F. E.	S. Cdr.	M.S.M.
Sills, A. K.	L. Cpl.	M.S.M.
Silverberg, E. A.	S. Sgt.	M.S.M.
Sim, J. G.	S. Sgt.	M.S.M.
Simmons, H. S.	S. Sgt.	M.S.M.
Simms, F.	Ar. S. Sgt.	M.S.M.
Simons, G. H.	Ar. S.M.	M.S.M.
Simpson, W. H.	Cdr.	D.C.M., M.S.M.
Sims, A.	S. Cdr.	M.S.M.
Sinnock, H.	S. Cdr.	M.S.M.
Sladdin, H.	H.	D.C.M., Cross of Karageorge 1st Class 7, Silver Medal on the Riband of St. Stanislas.
Slattery, F.	L. Cpl.	M.S.M.
Smith, A. H.	S. Cdr.	M.S.M.
Smith, A. J.	At. S. Sgt.	M.M.
Smith, E. C.	S. Cdr.	M.S.M.
Smith, F. P.	At. S. Sgt.	M.S.M.
Smith, G. W. M.	S. Cdr.	M.S.M.
Smith, H. A.	Cdr.	M.S.M.
Smith, H. C.	S. Sgt.	M.S.M.
Smith, H. W.	S. Cdr.	M.S.M.
Smith, R. E.	Sgt.	M.M.
Smith, T. A.	Sgt.	M.S.M.
Smurthwaite, A.	S. Q.M.S.	M.S.M.
Snelling, G.	S. Cdr.	M.S.M.
Southern, A. J.	Sgt.	M.S.M.
Sparey, O. F.	At. S.M.	M.M.
Spiers, W. H.	Ar. S.M.	M.S.M.
Spillane, R.	At. Q.M.S.	M.B.E.
Spillane, W. T.	At. S.M.	M.S.M.
Spraggs, H. V.	Sgt.	M.S.M.
Spreadbury, H. G.	S. Cdr.	M.S.M.
Squires, H.	S. Cdr.	M.S.M.
Stafford, F. S.	Cdr.	M.S.M.
Stagg, F. G.	S. Cdr.	M.S.M.
Staple, J. W.	Cdr.	M.S.M.
Stapleton, A. L.	S. Cdr.	M.S.M.

APPENDIX IX

393

Steeley, A.	S. Sgt.	M.S.M.
Stenning, A. W.	At. S. Sgt.	M.S.M.
Stevens, A. J.	S. Sgt.	M.S.M.
Stevenson, A. H.	S. Cdr.	M.S.M.
Stewart, J. H.	S. Cdr.	M.S.M.
Stidworthy, F.	Sgt.	Medaille Barbatie si Credinta, 2nd Class (Roumanian).
Stone, A.	A. Sgt.	M.S.M.
Stone, A. E.	S. Cdr.	M.S.M.
Stone, R.	S. Cdr.	M.S.M.
Straiton, W. L.	S. Cdr.	M.S.M.
Strange, A. T.	Sgt.	M.M.
Strange, J.	Cdr.	M.B.E., M.S.M.
Streek, W.	S. Cdr.	D.C.M.
Street, H. H.	At. S.M.	M.S.M.
Strovan, P.	S. Sgt.	M.S.M.
Stupple, E. H.	S. Cdr.	M.S.M.
Sturgess, W. H.	S. Cdr.	M.S.M.
Sutherland, W.	S. Q.M.S.	M.S.M.
Swinburne, J. H.	At. S.M.	M.S.M.
Sykes, A.	At. Q.M.S.	M.S.M.
Sykes, J. G.	At. S. Sgt.	The Bronze Medal for Military Valour (Italy).
Talbot, A. N.	S. Cdr.	M.S.M.
Talbot, J. M.	S. Cdr.	M.S.M.
Tarrant, E.	Cdr.	M.S.M.
Taylor, A.	S. Sgt.	M.S.M.
Taylor, A. G.	Pte.	M.S.M.
Taylor, F. H.	Cdr.	M.S.M.
Taylor, G. W.	At. S.M.	M.S.M.
Taylor, P. L.	At. S. Sgt.	Croix de Guerre (Belgium).
Theobald, F.	Sgt.	M.S.M.
Thomas, H. W. H.	Ar. S. Sgt.	M.S.M.
Thompson, E.	S. Cdr.	M.S.M.
Thompson, J.	2/Cpl.	M.M.
Thorman, L. P.	Cpl.	M.S.M.
Thornley, S.	Sgt.	M.S.M.
Timbers, M. C.	Ar. S. Sgt.	M.S.M.
Timms, R. H.	S. Cdr.	M.S.M.
Todd, D.	At. Q.M.S.	M.S.M.

Tomkins, A.	Ar. S. Sgt.	M.S.M.
Tomlinson, J. D.	2/Cpl.	M.M.
Towl, L. F.	At. S.M.	M.S.M., Croix de Guerre (Belgium).
Tozer, H. S.	At. S.M.	M.S.M.
Triggs, R. G.	S. Cdr.	M.S.M.
Truss, T. E.	Sgt.	M.S.M.
Tucker, P. F.	S. Cdr.	M.S.M., Medaille d'Honneur avec Glaives (en Bronze).
Tully, M.	Cdr.	M.S.M., Medaille d'Honneur avec Glaives (en Bronze).
Turner, G. A.	S. Sgt.	M.S.M.
Turner, H.	At. S. Sgt.	M.S.M.
Turner, J. G.	S. Cdr.	D.C.M.
Turner, N. V.	Sgt.	M.S.M.
Tweedie, C. M.	Cpl.	Silver Medal on the Riband of St. Stanislas.
Tyler, F. R.	At. S.M.	Croix de Guerre.
Tyler, G.	S. Q.M.S.	M.S.M.
Umney, V. V. J.	S. Cdr.	M.S.M.
Usherwood, J.	S. Cdr.	M.S.M.
Viant, A.	S. Cdr.	M.S.M.
Vigus, F. E.	At. S.M.	M.S.M.
Vines, E. G.	S. Q.M.S.	M.S.M.
Wakelan, A. G.	Ar. S. Sgt.	M.S.M.
Walker, F. O.	S. Sgt.	M.S.M.
Walker, H. J.	At. S. Sgt.	M.M.
Walker, H. J.	Sgt.	M.S.M.
Walker, J.	At. S. Sgt.	M.S.M.
Walker, J.	2/Cpl.	M.S.M.
Walker, R. W.	Sgt.	M.S.M.
Walker, W. J.	Pte.	M.S.M.
Waller, S. G.	Sgt.	M.S.M.
Want, B.	S. Cdr.	M.S.M.
Warder, J. W.	At. S.M.	M.S.M.
Wareham, C.	S. Cdr.	M.S.M.
Warren, C. A.	Ar. S.M.	M.S.M.

Watsham, A. V.	S. Cdr.	M.B.E., M.S.M., - Medaille d'Honneur avec Glaives, (en Argent) ; Silver Medal on the Riband of St. Stanislas.
Watson, A.	S. Cdr.	M.S.M.
Watson, J. H.	At. S. Sgt.	M.M.
Watts, A. E.	S. Sgt.	M.S.M.
Watts, A. W.	S. Cdr.	M.S.M.
Watts, G. T.	S. Sgt.	M.S.M.
Watts, H. S.	At. S.M.	M.S.M.
Wavell, J. H.	Sgt.	M.S.M.
Webb, A.	S. Sgt.	M.S.M.
Weir, L.	S. Sgt.	M.S.M.
Welding, B.	S. Cdr.	Medaille d'Honneur avec Glaives (en (Bronze).
West, G.	S. Sgt.	M.S.M.
West, R.	Cdr.	M.S.M.
Western, H. G.	Cdr.	Decoration Militaire avec Croix de Guerre (Belgian).
Wheeler, F.	Cdr.	M.S.M.
Wheeler, J. E.	S. Cdr.	M.S.M.
White, E. F.	S. Cdr.	M.S.M.
Whitehead, H. J.	At. S.M.	Medaille Militaire, Croix de Guerre.
Whittle, F.	S. Cdr.	M.S.M.
Wigmore, F. G.	S. Cdr.	M.S.M.
Wild, H.	Cpl.	M.S.M.
Wilde, G. S.	L. Cpl.	M.S.M.
Wilkins, A. J.	S. Cdr.	M.S.M.
Wilkins, H. A.	At. S.M.	M.S.M.
Wilkinson, J.	At. Q.M.S.	M.S.M.
Wilkinson, R. J.	Ar. S. Sgt.	M.S.M.
Willes, H. R.	S. Cdr.	M.S.M.
Willetts, A.	Ar. S. Sgt.	M.S.M.
Williams, A. E.	Cdr.	M.S.M.
Williams, A. W.	S. Cdr.	M.S.M.
Williams, C. A.	Ar. S.M.	M.S.M.
Williams, C. F.	2/Cpl.	M.S.M.
Williams, F. N.	Sgt.	M.S.M.

Williams, G.	At. S.M.	M.S.M.
Williams, W. S.	S. Cdr.	M.S.M.
Willis, W. C.	At. S. Sgt.	M.M.
Wilson, H.	Ar. S. Sgt.	M.M.
Wilson, J. A.	S. Cdr.	M.S.M.
Wilson, J. W.	Cdr.	M.S.M.
Wilson, L. M.	Ar. Q.M.S.	Medaille Militaire.
Wilson, T.	S. Cdr.	M.S.M., Medaille d'Honneur avec Glaives (en Argent).
Willson, T.	At. S.M.	M.S.M.
Wilton, G.	Sgt.	M.S.M.
Wink, R. C.	S. Sgt.	Medaille d'Honneur avec Glaives (en Bronze).
Winstanley, J. H.	Cdr.	M.S.M.
Winterbottom, E.	S. Cdr.	M.S.M.
Winward, H. H.	At. S.M.	M.S.M.
Wombs, P. H.	At. S.M.	M.S.M.
Wood, H. W.	Pte.	D.C.M.
Wood, J. W. M.	S. Sgt.	M.S.M.
Wood, T.	Cpl.	M.S.M.
Wood, T. W.	At. S. Sgt.	M.S.M.
Woodard, A. E.	S. Cdr.	M.S.M.
Wookey, W. H.	S. Cdr.	M.S.M.
Woolner, H. T.	Cdr.	M.S.M.
Worsfold, D.	S. Cdr.	M.S.M.
Worlidge, A. V.	Pte.	M.S.M.
Wray, W. G.	Ar. S. Sgt.	M.S.M.
Wright, A. D.	L. Cpl.	M.S.M.
Wright, H.	S. Cdr.	M.S.M.
Young, J. E.	S. Cdr.	M.S.M. Silver Medal on the Riband of St. Stanislas.
Young, S.	Cdr.	M.S.M.
Young, S. L.	Cdr.	M.S.M.

APPENDIX X

ROLL OF HONOUR

OFFICERS

Anderson, R. D. A., Maj.	King, H., Lieut.
Andrews, C., Capt.	Kirby, F. E., Capt.
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Williams, J. W., Pte.	
Willmott, F., Sgt.	Young, S., L. Cpl.

INDEX

- Abbeville, 25, 27, 90, 92, 110, 120, 165, 168
 Accountancy, 72, 77, 83, 95, 100, 112, 114, 135, 176, 182, 226, 228, 240, 276
 Aden, 213
 A.D.O.S Corps, France, 69, 142, 151
 A.D.O.S. Provision, France, 92, 113, 180, 182
 Aintree, 208
 Air raids, 125, 130, 157, 167, 169, 196, 206, 244, 306
 Alaway, Capt., 160
 Alexandria, 211 *et seq.*, 223, 228, 252, 270, 277
 Alexandretta, 265, 268
 Amara, 273, 285
 American troops, equipment for, 169, 183, 203
 Amiens, 8, 10, 105
 Ammunition : defects and repairs, 49, 52, 53, 61, 64, 136, 245, 275, 330 ; depots, lay-out, 120, 122, 127 ; disposal, post-armistice, 181, 183, 210, 292 ; explosions, 123, 125, 143, 160, 169, 234, 244, 292, 325 ; general, 103, 165, 189, 199, 214, 228, 230, 241, 247, 290, 311, 322 ; statistical, 40, 121, 125, 128, 130, 163 ; supply, 9, 22, 28, 48, 116 *et seq.*, 157 *et seq.*, 173, 257, 279, 285, 305
Anglo-Indian, s.s., 222, 229
 Antwerp, 182
 Anzac, 219, 222, 229, 233
 Archangel, 326, 332
 Armourers, 74, 81, 261 (footnote)
 Arquata, 311
 Artillery Adviser, 63
 Audruicq, 121, 125, 129, 166
 Austin, Brig. Gen., 229
 Baghdad, 249, 272, 279, 285, 291
 Bailey, Capt., 170 (footnote)
 Bainbridge, N., Col., 133
 Bainbridge, P. A., Brig. Gen., 227, 252
 Bakaritzza, 327
 Baker, J., Col., 18
 Baker, Lt., 245
 Baku, 249, 272, 290
 Baltic, 325
 Bancroft, S. Condr., 170 (footnote)
 Banfield, Capt., 158
 Barocchi, Mrs., 110
 Bashford, Maj., 252 (footnote)
 Basrah, 272, 274, 285, 291
 Batoum, 249
 Beavor, Miss, 110
 Beckett, S. Condr., 162
 Beirut, 265, 267
 Bereznik, 328, 331
 Bernard, Col., 113
 Blackburn, Lt. Col., 155 (footnote)
 Blargies Nord, 125, 129, 138, 166, 169
 Blargies Sud, 90, 125
 Blunt, Lt. Col., 231
 Bombs, 41, 108, 142, 212, 228
 Boota Singh, Rai Badahur, 278
 Boots, 20, 74, 109, 201, 259, 289, 328
 Boulogne, 8, 10, 27, 91, 117, 124, 128, 139
 Bourbourg, 131, 181
 Bramley, 199, 210
 Brest, 91
 Bulgaria, 218, 236, 247
 Bulk issues, 6, 16, 21, 29, 72, 113, 256
 Bush, Col., 68 (footnote)
 Butcher, Sir G., 194, 196
 Cairo, 211, 252, 269
 Calais, 89, 92 *et seq.*, 109, 110, 112, 129, 165, 179, 183
 Camouflage, 43
 Campbell, Verchoyle, Col., 9, 23, 244
 Captured stores, disposal, 78, 180
 Caspian Sea, 249, 290

- Chanak, 219, 251
 Chaplin, Lt., 152
 Cherbourg, 91, 214
 Chilwell, 208
 Clarke, Sir Travers, 65
 Clothing, 32, 45, 77, 102, 167, 176, 182, 190, 200, 207, 214, 232, 239, 246, 259, 276, 283, 288, 312, 328
 Cologne, 182
 Constantinople, 218, 236, 248 *et seq.*
 Conteville, 131, 167, 181
 C.O.O. Ammn., France, 133, 180
 C.O.O., Base, France, 93 *et seq.*
 Corbett Sullivan, Lt., 170 (footnote)
 Craighead, Lt., 144 (footnote)
 Creil, 111, 165
 Crimea, 324
 Cross, Pte., 162
 Croydon, Maj., 331
 Cunningham, Maj., 24, 60

 D.A.D.O.S. of Division, 19, 29, 70, 143, 152, 228, 232, 288, 299
 Dannes, 129, 184
 Dar es Salaam, 295, 300, 303
 Darwin, Maj., 237
 Davies, Col., 107
 D.D.O.S. Army, France, 68, 82, 123, 143, 151
 D.D.O.S. G.H.Q., France, 7, 22, 55 *et seq.*, 117, 123
 D.D.O.S. L. of C., France, 55, 89, 91, 92, 180
 Deir el Belah, 254, 256
 Deir Sineid, 259, 263
 Demobilization, 175 *et seq.*, 207 *et seq.*, 217, 268, 291
 D.E.O.S., 15, 192
 De Wolff, Lt. Col., 318, 321
 Didcot, 196, 199, 209
 Dieppe, 91, 129, 167
 Disposals Board, 183, 184, 208, 249, 293
 Docks Directorate, 97, 133
 Doggett, Sergt., 332 (footnote)
 Donovan, Maj., 244, 322
 D.O.S., 3, 7, 19, 55 *et seq.*, 83, 92, 227, 236 (footnote), 237, 240, 274, 293, 297, 309
 Dowling, Capt., 153
 Drew, S. Sergt., 84 (footnote)
 Dublin, 206
 Dumps, formation, 72, 151, 164, 173, 229, 232, 243, 288, 312
 Dunkirk, 28, 129, 179

 East Africa, 213, 295 *et seq.*
 Egan, Col., 7, 13
 Egypt, 211, 213, 252, 269
 El Arish, 254, 256, 263
 Etaples, 89, 165
 Everett, Col., 107

 Fanshawe, Lt. Col., 292
 Farquharson, Maj., 206 (footnote)
 Fère-en-Tardenois, 22, 24
 Fernyhough, Lt. Col., 59
 Ferry Post, 253, 255
 Finch, Capt., 245
 Findlay, Lt. Col., 195
 Fisher, C. T., Lt. Col., 297, 326
 Foote, Col., 298
 Forbes, Maj. Gen., 3, 68 (footnote), 290
 Fox, Capt., 332 (footnote)
 Fressenville, 139, 165, 184
 Fuller, Sir B., 106

 Gallipoli, 211, 218 *et seq.*, 251
 Gascoyne, S. Sergt., 155 (footnote)
 Gatt, Capt., 231, 234
 Gay, Capt., 156
 Gee, Capt., 160
 Genoa, 310
 Georgetown, 208
 Gradisca, 305, 307
 Gravelle, 27, 100
 Grenades, 41, 142, 145, 212, 228, 231
 Group system, 4, 6, 94, 112, 133, 276
 Guns: 39, 90, 153, 156, 166, 174, 189, 206, 228, 287, 313, 322; components, 47, 108, 330; de-

- signs, 60; repairs, 31, 53, 78, 84, 111, 153, 189; vital statistics, 49, 61
 Gun Parks, 82, 90, 151, 155, 173, 189, 312
 Hadley, S. Sergt., 331
 Hadoke, Lt., 206 (footnote)
 Haifa, 265, 267
 Haigh, Capt., 145
 Hale, Brig. Gen., 68 (footnote), 309
 Hamilton, Col., 68 (footnote), 231
 Harris, S. Condr., 170 (footnote)
 Havre, 7, 11, 26, 89, 92 *et seq.*, 112, 165, 179, 182
 Hay, Col., 254
 Hayley, Lt. Col., 305, 308, 311
 Hedjaz, 213, 255, 261
 Helles, 219, 222, 230, 233
 Heron, Sir T., 17, 89, 103, 112
 Heylin, Mr., 198
 Hickson, Lt. Col., 327, 332
 Hill, B., Lt. Col., 222
 Hill, D., Col., 303
 Hilsea, 335
 Hoplins, Maj., 170
 Hornan, Lt., 244
 Horse Transport Depot, 16, 27
 Howell Jones, Col., 230, 234, 275
 Imbros, 224
 Indents, 93
 Indian equipment, 32, 262, 273, 277, 282
 Indian Ord., 32, 229, 262, 273, 282, 298
 Inspection, equipment and clothing, 197, 201, 202
 Inspector Gen. L. of C., 7, 10, 14, 17, 50, 55, 59, 227
 Intermediate Clearing Stations, 182
 Issues, 94
 Italy, 215, 305 *et seq.*
 Jackson, Sir R., 213, 227, 238
 Jarman, Lt., 206 (footnote)
 Jarvis, Cpl., 206 (footnote)
 Jasper, S. Sergt., 170 (footnote)
 Jerusalem, 258, 260
 Johnson, Lt., 170 (footnote)
 Johnson, Sir B., 202
 Jones, Routh, Major, 71
 Junction Station, 259
 Kantara, 215, 253, 254, 263, 265, 269
 Keddie, Col., 104
 Kemp, Capt., 281
 Khan Yunus, 254
 Kilia, 251
 Kilindini, 300
 Kut, 272, 279, 285
 Laboratories, 137, 144, 206, 245,
 Labour, 100, 135, 145, 181, 197, 207, 240, 261, 263, 274, 283, 287, 317, 319
 Laundries, 45, 77, 101, 202, 263, 285
 Lawrence's Arab Force, 213, 258, 261
 Le Mans, 10, 15, 26
 Lemnos, 211, 219, 224
 Le Treport, 91, 167
 Les Attaques, 90
 Ludd, 259, 263
 Lyons, 214
 Machine Guns, 40, 48, 74, 228, 322
 Major General, R.A., 63
 Man, Maj., 224
 Manœuvres, army, 1, 7
 Marfleet, Maj., 114
 Marseilles, 32, 91
 Master Gen. of Ord., 62, 66, 194, 336
 Mathew, Sir C., 7, 22, 56, 236 (footnote), 240, 243, 282, 290, 335
 Maxwell, Sir R., 17, 55, 65
 McCheane, Lt. Col., 223
 McCluskey, Mr., 206 (footnote)
 McVittie, Col., 292
 Meares, Col., 199

- Mediterranean line of communications, 91, 214, 312
 Mersina, 265, 267
 Mesopotamia, 212, 215, 268, 272 *et seq.*
Minnetonka, s.s., 223, 228
 Ministry of Munitions, 60, 63, 183, 194, 199, 208
 Mobilization, 7, 19, 203
 Mombasa, 295, 298, 300
 Mont Notre Dame, 24
 Montreuil, 59, 67
 Morgan, Miss, 110
 Morison, Sir W., 106
 Mortars, 41, 108, 212, 228, 269, 313
 Mosquito nets, 190, 246, 303
 Mosul, 272, 291
 Moulton Barrett, Col., 68 (footnote)
 Mudros, 219, 222, 224, 234
 Munition factories, 47, 107, 111, 209
 Murmansk, 326, 332

 Nairobi, 295, 300
 Nantes, 10, 15, 26
 Novorossisk, 318, 324

 Officers' shops, 46, 70, 152, 164, 247, 276
 Oldfield, Col., 116 (footnote), 133, 295 (footnote)
 Onega, 328, 331
 Ordnance Ammunition Unit, 142, 144, 158, 181, 292
 Ordnance, Officer, Army Troops, France, 70
 Ordnance Officer, Base Depot, France, 94
 Ordnance Officer, Corps Troops, France, 69
 Ordnance Officer, Supply Railhead, France, 91
 Ostend, 27
 Ovada, 311

 Padua, 311
 Palestine, 212, 215, 252 *et seq.*, 283, 284
 Palmanova, 305, 307
 Paris, 90, 103, 168, 215
 Parsons, Sir H., 25, 32, 55, 174, 207, 335
 Paul, Lt. Col., 32, 60
 Penton, Sir E., 201
 Perry, Sir H., 7, 14, 17, 23, 227, 273, 279, 282
 Persia, 249, 272, 290
 Personnel, 192, 197, 274
 Phillips, Lt., 206 (footnote)
 Pimlico, 200
 Polson, Sir T., 202 (footnote)
 Port Said, 253, 255, 265
 Portuguese troops, 91
 Primrose, S. Sergt., 84 (footnote)

 Quartermaster General, 7, 22, 39, 50, 55, 59, 63, 83, 119, 194
 Quevilly, 121, 123, 128

 Rafa, 254, 256
 Rag industry, 101, 202
 Reed, Col., 277
 Reed, Lieut., 123 (footnote)
 R.E. Parks, 44, 90
 Respirators, 43, 56, 110
 Reval, 325
 Rifles, 41, 48, 74, 275
 Riga, 325
 Rivalta, Scrivia, 311
 Robertson, Lt. Col., 316, 318
 Robertson, Field Marshal Sir William, 55, 67
 Romescamp, 92
 Rothermere, Lord, 202
 Rouen, 8, 10, 27, 90, 120, 123, 165, 179
 Routh, Maj., 297
 Rouxmesnil, 91, 129, 166
 Russia, 183, 249, 289, 315 *et seq.*

 Saignville, 129, 166, 171
 Sales Board, 293
 Salonika, 212, 215, 236 *et seq.*
 Salvage, 51, 75, 100 *et seq.*, 144, 151, 164, 167, 174, 180, 248, 260, 265, 288

INDEX

409

- Samarra, 280, 287
 Sandbags, 44, 228
 Scott, Brig. Gen., 68 (footnote), 89, 297
 Servia, 218, 221, 236, 248
 Sevastopol, 324
 Seymour, Brig. Gen., 193
 Sheik Saad, 274, 278, 285
 Shellal, 256
 Sheppard, Lt. Col., 312
 Siberia, 316
 Signal service equipment, 41, 44
 Slade Baker, Brig. Gen., 27, 114
 Smith, D. R., Lt., 152
 Smith, Usher, Brig. Gen., 68 (footnote), 71, 236 (footnote), 243
 Smyth, Lt. Col., 311
 Soap factory, 245, 246
 Somerset, Duke of, 194
 Sparey, Capt., 297
 St. Nazaire, 10, 14, 27
 St. Omer, 25, 91, 117
 Steel helmets, 43
 Steevens, Sir J., 15, 192, 200, 335
 Stokes, Lt. Col., 61
 Suez, 253, 255
 Supreme Allied Command, 53
 Surveyor General of Supply, 194
 Suvla, 220, 231, 233
 Tanks, 35, 38, 40, 173, 336
 Taranto, 214, 312
 Teale, Maj., 231, 234
 Tel-el-Kebir, 253, 262
 Tent repair units, 278
 Theodosia, 324
 Toms, Capt., 181
 Transport: mechanized, repairs, 8, 9, 27, 30; pack, 42, 78, 190, 246, 290, 301, 312, 313; vehicular, 46, 189, 212, 228, 245, 262, 277, 290, 301, 312, 334
 Transportation, Directorate: 50, 59, 97; inland, 9, 16, 20, 28, 49, 94, 131, 134, 149, 151, 173, 214, 239, 243, 255, 262, 278, 283, 287, 290, 301, 307, 310, 328; sea, 11, 15, 50, 96, 167, 195, 199, 212, 214, 221, 233, 238, 249, 255, 265
 Travers, Col., 214
 Triggs, S. Condr., 332 (footnote)
 Trimnell, Col., 114
 Trouville, 91
 Tuckett, Maj., 229
 Tufnell, Col., 68 (footnote)
 Umsinga, s.s., 221, 230
 Valdelièvre, 89, 100, 178
 Vendroux, 97
 Villeneuve-St.-George, 24
 Vladivostock, 218, 316
 Wailly, 59
 War Memorial, 335
 War Office, 192, 215
 War reserves, 7, 11, 17, 203
 Waterproof sheets, 46
 Watts, Col., 8, 68 (footnote), 113
 Weedon, 194
 Willey, Sir V., 202
 Wilson, Capt., 154
 Wire-cutters, 41
 Woodhead, Lt., 162
 Woolwich, 194, 196, 335
 Workshops: base, 8, 106, 189, 214, 217, 241, 311; general, 30, 45, 47, 52, 61, 73, 151, 180, 190, 206, 213, 260, 287, 307, 330, 333; mobile, 32, 78, 84, 151, 153, 164, 173, 189, 245, 248, 258, 264, 274, 278, 288, 323
 Wortham, Col., 197, 236 (footnote), 251
 Wrigley, Brig. Gen., 192
 Yukon packs, 42, 108
 Zeneghem, 129, 138, 166, 181

